MESSAGE

OF

ROBERT T. CONRAD,

Mayor of the City of Philadelphia,

WITH

ACCOMPANYING DOCUMENTS.

READ IN SELECT COUNCIL MAY 17th, 1855.

PHILADELPHIA:
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1855.

Report from the Chief Commissioner of Highways.

DEPARTMENT OF PUBLIC HIGHWAYS,
May 12th, 1855.

TO HON. ROBT. T. CONRAD, *Mayor.*

DEAR SIR: — Your communication, asking information relative to this department, is received; and I shall endeavor to give all the information at my command, that the limited time will admit of.

Previous to the consolidation of the city, and until the organization of this department in October last, the executive duties now performed by it, were in the hands of committees of the various districts, superintendents, supervisors, clerks of districts, and other officers, of whose doings and expenditure this department has no means of ascertaining.

The published report of the City Controller, shows the aggregate payments made up to the first of January; and annexed you have a statement, marked "A," showing the contracts (belonging to this department,) made by the late districts, that remained unsettled on the first of January, with the amounts paid on them since that date, and the estimated cost of completing the same, amounting to $217,575 56. In addition to which, on the 13th March last, Councils appropriated the sum of $80,000 for the payment of claims prior to January first, about $50,000 of which is chargeable to the old districts; making an amount of $267,575 56 of liabilities incurred previous to consolidation, to be settled by the new city during this year.

The organization of the department, as provided for by the ordinance approved August 29th, 1854, consists of a chief commissioner, six commissioners, and forty-two super-

visors. For the better supervision, the city has been divided into six districts, as follows:

1st	District comprises	1st, 2d, 3d and 4th wards, - -	6	supervisors.
2d	"	" 5th, 6th, 7th, 8th, 9th, 10th and 24th wards,	11	"
3d	"	" 13th, 14th, 15th and 20th wards, -	6	"
4th	"	" 11th, 12th, 16th and 17th wards, -	5	"
5th	"	" 18th, 19th and 23d wards, - -	8	"
6th	"	" 21st and 22d wards, - - - -	6	"

Each district is in charge of a commissioner, who has an office within the same; the supervisors have each their ward, or division of a ward, and have the immediate charge of the laborers employed on the streets or roads, in paving, grading and cleansing, and are subject to the control of the commissioner, and purchase no materials without his orders.

Since the passage of the supplement to the Consolidation Act, the commissioners and chief meet weekly, as a board, in accordance with the requirements of that document.

The department has been in existence little more than six months, and that including the winter months. Its operations have been confined to the cleansing of the streets, repairing of roads and bridges, grading new streets, preparatory to the contemplated improvements of the present year, repairing sewers and inlets, and repairing the paved streets, after the severe frosts of the past winter.

The ordinance to regulate the manner of paving the streets having passed Councils a few days since, the Board submitted a list of streets to be new paved, to the late Committee on Public Highways, who reported the same to Councils, at their last meeting. As soon as the same will receive the sanction of Councils, the department is prepared to commence, without delay, the paving of new streets, as asked for by the owners of property; the appropriation for that purpose, is $200,000—a sum more than fully equal to

meet all demands for the year; and the return to the treasury may be safely estimated at three-fourths of the amount expended.

The other sources of revenue received at this office, consists of permits granted for buildings, for openings to the sewers, licenses for omnibuses, hackney-coaches, wagons, carts, barrows, &c. Most of the ordinances regulating them have been passed within the last month; I am unable, at this time, to make any estimate of the amount to be derived from them.

The statement annexed, marked "B," shows the appropriations made to this department since the first day of January, with the purposes for which the same were made, and the actual amount for new works during the year, to be $658,310; which, however, might be further reduced, as the item No. 7, of $400,000, is for completing contracts made prior to consolidation.

The amounts of the second appropriation are believed to be ample to meet the demands for the objects for which they were made.

Two important works to be paid from the item of "Grading Streets," are—first, the opening of Delaware avenue, from Callowhill street to Cohocksink creek, which is now rapidly progressing—the other, the opening of Girard avenue, from Landing street to the Schuylkill, to connect with the bridge now nearly completed. This work has been delayed by the necessity of calling a jury to assess the damages to the property through which the same must pass. As soon as that can be settled, the work will be pushed forward as rapidly as possible.

Among the subjects to be recommended to the consideration of Councils—

The providing for the payment of damages for opening streets should receive early attention; many are due, for

which no provision has yet been made. An ordinance, creating a loan of $100,000, to meet such demands, was reported by the late Committee on Highways, and has been duly published, as required. Should it be enacted into a law, it would materially aid in forwarding desirable improvements.

A bridge over the river Schuylkill, at Chestnut street, was provided for by Act of Assembly, and the sum of $125,000 borrowed for the purpose of erecting it; no improvement is more desirable. Much attention was given to the subject by the Committee on Highways; and a report, recommending the adoption of a plan now in this department, is before Councils for their action. A work of so much importance to the public, should receive early attention.

The Department of Surveys is preparing plans and specifications for the culverting of Cohocksink creek, from Front street to Sixth street: also for culverts in Moore street, from the Delaware to Ninth street, and in Vine street, from Nineteenth street to the Schuylkill. As soon as received, proposals will be issued for their construction, and the result will be reported to Councils for their action.

An ordinance was reported to Councils, providing for the opening of Broad street, of its full width, (113 feet,) to the Germantown road — an improvement much desired, which I trust will receive your recommendation.

The opening of one or more of the wide avenues running from the Delaware to the Schuylkill, in the northern part of the city, is a subject that should be strongly urged upon Councils, as the expense at this time would be trifling in comparison to what it will cost at a future day.

That portion of the City Railroad lying east of Delaware Eighth street, is in bad condition; and no appropriation was made by the late Councils, for keeping it in repair. In its

present condition, it is a nuisance, and should be either relaid, on an improved plan, or should be taken up forthwith.

Machines, constructed for the purpose of cleansing streets, have recently been introduced here; and a portion of the City of New York is now being cleansed with them. A proposition from the proprietors is now being prepared, for the cleansing a portion of our city, which will be submitted to Councils in a few days. The cleansing of the streets, with the exception of the six wards comprising the old city, is now done by day's work; it could be equally well done, at much less cost, if divided into districts, and let by contract.

The subject of laying passenger railroads through the city, was referred to the heads of the Survey and Highway Departments; the duties connected with the organization of the Survey Department has deferred action for the present. It will be taken up and reported upon at an early day.

I would suggest the propriety of recommending to Councils the passing of an ordinance requiring railroad companies to have gates and watchmen at points where their locomotives cross on a level with highways much used.

The foregoing are such subjects as occur to me at this time, and are thrown together for your consideration. The department having been in existence so short a time, and having no record of the aggregate expenditures on the highways by the county and districts, prior to its organization, no comparison can be made of the cost of the present, as compared with the past system.

Very respectfully,

THOMAS BIRCH,

Chief Commissioner.

A.

STATEMENT

Of Contracts made by Corporations prior to the Act of Consolidation, the settlement of which must be made during this year.

Amounts paid since January 1st, 1855—

District of Richmond, for seven bridges over Gunner's Run,			$31,673 17
do do culverts at do			4,778 00
do do street paving,			5,858 97
District of Kensington, for culverts,			23,207 25
Southwark, for paving,			2,577 93
West Philadelphia, for paving,			6,473 20
Germantown, for grading,			1,200 00
Girard Avenue, for grading, Montgomery and Berks Avenues, grading,			7,900 00
Girard Avenue bridge,			8,835 20
Thompson street culvert,			20,000 00
Estimated amount required to complete them,			$112,483 72
*Richmond bridges,	$25,000 00		
* do culverts,	3,000 00		
*Kensington culverts,	5,000 00		
Germantown, grading,	1,000 00		
*Kensington, grading,	3,091 84		
Girard Avenue, grading,	30,000 00		
Montgomery and Berks, grading,	15,000 00		
Girard Avenue bridge,	15,000 00		
Mill Creek bridge,	5,000 00		
*Thompson street culvert,	3,000 00		—105,091 84
			$217,575 56

* Payable in bonds.

Report from the Department of Surveys.

DEPARTMENT OF SURVEYS,
Office of Chief Engineer and Surveyor,
Philadelphia, May 14th, 1855.

To His Honor, ROBERT T. CONRAD,
Mayor of the City.

SIR:—Your circular of date, May 1st, instant, has just been handed me. I hasten to comply with your wishes therein

set forth, so far as the limited time allowed for their preparation and the short time that has elapsed since I have had an opportunity of becoming familiar with the detail of this department will permit. The existence of this department can date only from the 7th inst., as all arrangements previously made were rendered nugatory by an Act of the Assembly, changing entirely its organization.

The interests connected with and under charge of this department, are of great importance to every individual of our extended city, and have not heretofore received that attention which is their due. The documents, plans, &c., under our charge, relating to property lines and lines of streets, are of incalculable value to the city and property holders generally, and should be guarded and preserved with jealous care.

I therefore ask for an office, wherein sufficient room can be had for such arrangements as will allow easy reference, and render them secure from loss or destruction. If offices, with a proper attention to security, were furnished to the Surveyors and Regulators, it would add much to the safety of valuable papers which will require time to be concentrated in the general office.

The sanitary interests of the city, are, to a great extent, in our charge, and are, without doubt, seriously affected by a want of information that should be in the possession of this department. This can be reached only by minute and extended examinations, as to the state and position of existing sewers, and also for the purpose of obtaining plans to regulate future drainage. For this purpose I desire assistance, with which a complete drainage map can be completed, exibiting the topographical features of the city. This is rendered necessary from the accumulation of business that requires the constant and undivided attention of the Surveyors and Regulators, preventing an energetic action on their part, to other than

the immediate duties for which they have been elected. This assistance to the Chief Engineer and Surveyor, could take charge of the construction of all sewers, bridges, and other improvements, and insure that proper attention will be given to the character of the work, from the imperfections of which, heretofore, the city has suffered serious pecuniary loss.

Another matter, which is very necessary for early attention, is, that all ordinances relating to Surveyors and Regulators, framed for the old city and districts, previous to consolidation, be made to harmonize, that we may have a uniform system and basis to work on, over the entire city.

The expenses for the current year will be as follows:

Chief Engineer and Surveyor, -	$3,000 00	
Clerk and Messenger, - -	1,600 00	
Draftsman, - - - -	800 00	
Twelve Surveyors and Regulators, $500 each, - - - -	6,000 00	
		$11,400 00
Office Rent and Stationery, - - -		1,600 00
Extra Assistants, - - - - -		2,500 00
		$15,500 00

There are no projects or improvements that I can safely say should be deferred, other than the Schuylkill bridge at Chestnut street, the immediate necessities for which are not pressing, but the Cohocksink culvert should be proceeded with at the earliest moment, yet not without full examination as to its location and proportions, neither of which have been satisfactorily ascertained or reported upon, and immediate attention should also be given to any culverts that now deliver sewerage into the dam at Fairmount, and means taken to

connect them with others delivering below the dam, that the water supplied for city use should not be affected deleteriously thereby.

Very respectfully,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
Philadelphia, Dec. 30, 1856.

To the Hon. RICHARD VAUX,
Mayor of Philadelphia:

SIR:—The season having arrived that calls for communications from the heads of departments to the chief executive of the city, relative to the condition and interests of their several offices, I take great pleasure in reporting that, during the past year, this department has continued to develope its usefulness, as the information sought by and afforded to our citizens fully attests, and each year will the amount, and consequently the value, of our records be augmented, not only by accumulation from returns of daily regulations and surveys extending the city plan now in progress, but by the compilation and arrangement of what can be collected from old and valuable documents transferred to this office at its organization. We have now, so far as lies within our power, made that disposition of the city archives in our charge, as will insure easy

reference without loss of valuable time, yet there is much information sought for at this department, not on record in any of the city offices, which should be upon our files, but cannot be obtained without the aid of Councils. To this point I will refer in this report for your consideration.

The meetings of the Board of Surveyors, during the past year, have been frequent, and the results of much value, not only in matters of direct interest to the city, but in the settlement of differences between individuals relating to partition lines, which otherwise might have become vexed questions for tedious and expensive litigation.

The great difficulty under which we labor is, that there is no uniformity in the acts of Assembly bearing upon matters of survey and regulations for the present limits of the city; the old laws enacted for the districts, as they existed previous to consolidation, have never been repealed, and, consequently, the duties required for one section of the city, without marked boundaries, sometimes covering parts of two survey districts, differ materially from those of other sections. This causes confusion. It is very desirable that one set of laws should cover the whole, as being more intelligible, besides simplifying business for all parties.

Again, there are cases where laws creating commissioners for the purpose of conducting the survey and regulations of particular districts of the city are in full force, and which either tend to delay the improvement of that district or deprive this department of supervision and direction in the very matters it should be most familiar with; these should be under its especial charge to insure perfect connections between sectional plans, and also that they be prepared with proper reference one to the other.

When surveys are conducted out of the control of the department, there is no certainty that either a properly graduated measure, or the accurate datum level is made use of; and after the plans are filed amongst our records, and are used by the district surveyors for the necessary subdivisions, serious discrepancies must be risked.

Another matter in which the interests of the city, we think, could be greatly advanced is, that there should be placed upon our record books a plot of the ground on which each and every house may be erected; this would prevent perplexing appeals, and secure the accurate division of properties, which, as now performed by the builders themselves, with imperfect measures, frequently places partition walls in positions very different from that recited in the deed. The ordinance under which we are now acting is not sufficiently definite in this particular, though the intention in framing it was evidently to cover the ground alluded to; its revision is very desirable, not only with reference to the question just spoken of, but that the schedule of rates payable to the surveyors and regulators, as well as their special duties for the emolument yearly allowed them by the city, shall be clearly defined. The ordinance now reads, "that they shall receive an annual salary of $500, for keeping the public records, performing all services as a member of the Board of Surveyors and *all other official* services that may be required for the city," in addition "to such fees and charges as are provided for" in Section 11, which section particularlizes the prices to be paid by individuals for regulation of lots, as well as a few items, for which the city is responsible, but does not cover the payment for surveys which are indispensable for the interests of the city, and which it would be unjust to expect to have performed as "*other official service*," when the actual outlay by the surveyor, for an ordinary sectional plan, often exceeds the amount voted as annual salary.

That these surveys, and the preparation of sectional plans should continue to be prosecuted is, we deem, imperative. Our suburban area is rapidly improving, and, in some instances, waiting only the extension of the city plan to be classed among the populous districts, and yield a *yearly revenue*, from increased taxation, far greater than the required amount to complete the preparatory surveys; these surveys, once completed, may well be considered capital invested,

from which a large percentage is at once derived, with a yearly increase. I would further observe, that though this department may appear to draw largely upon the treasury, yet the amount of appropriation asked for yearly, will (exclusive of salaries) decrease as the plotting of the city progresses, and, when completed, will preclude further calls for heavy damages, on account of injury to estates or suburban residences, which, without the planning, might, and in all probability would, be so arranged as to demand, with justice, heavy amounts from the city when its requirements would bring them within the street limits—the truthfulness of this may be seen by referring to the amount of damages paid for the opening of the late Township of Penn, in comparison with other sections where the planning was delayed. An early attention to the arrangement of the city plot over the rural districts will prevent the adoption of lanes and bye-roads as *fronts* of properties. These can now be disregarded and vacated at the proper time, without being embraced in the city plan, destroying either the direct line of streets or that rectangular form of blocks which is, in every particular, most acceptable and judicious. A still more cogent reason, if possible, is, that it is only from these plans that systems of drainage can be arranged, and without them the hasty construction of a sewer is often called for, the sizes for which it is impossible to determine with any regard to accuracy, and the city is either entailed with a heavy excess of expenditure, for the purpose of being on the safe side, or for the want of the proper proportions, is taxed with a heavy outlay to repair the evils committed, and, in either case, the amount could easily far exceed the cost of the plans necessary to contain proper data.

I, now, sir, beg leave to refer to some duties which devolve upon the Department of Highways, but properly belong to this, and are, no doubt, looked upon rather as an incubus, interfering with their already extended and arduous labors, viz: The charge and general direction for the construction of all culverts or drains built by individual enterprise. These should be

placed in this department. The form of ordinance has already, in a number of instances, received the approval of Councils, as well as the sanction of your honor, but, by adopting it as a general rule, it would facilitate operations and secure for our department records of great value. Another duty, which is a burden to the same department, is that of issuing permits for connections with culverts, and, as now arranged, can be but imperfect, as their office contains no record as to whether a culvert is in existence at the locality applied for, while this department is in possession of the only information relative to culverts that can throw light upon the value or injury that the connection asked for might be to the sewer; that these connections should be properly constructed, and their junctions with the sewers made in the most approved manner, is very necessary, as in the one case they may be beneficial, while in the other they would retard the flow and lessen the delivery of the sewer. Heretofore, there has been no note taken of these connections further than date of permit, but it is desirable that the location, level, material and gradient should be on record for reference, and, if placed in charge of this department, they would be constructed under the eye of the District Surveyor, in accordance with regulations made by the Board of Surveyors, and such returns thereof made for the files of this department as would be useful for reference by our citizens.

Another very great want is, that the location, sizes and gradients of all the sewers of our city are not known with accuracy. We have daily calls for information we should have relative to them, but we either do not possess it, or it is in such a meagre or unavailable shape as to be of comparative little value. All builders will, I feel assured, second me in asserting that such information would be of infinite value to them, and could be obtained without great expense to the city.

In conclusion, sir, I beg leave to state that much of this matter has been communicated to Councils in reports made by me during the past year, but as, in the multiplicity of their business and accumulation of

documents, they have been lost sight of, I take the liberty of thus calling your attention thereto, hoping, that should you think them worthy of consideration, a notice from you will meet with effective attention.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF HIGHWAYS.

HIGHWAY DEPARTMENT,
January 1st, 1857.

HON. RICHARD VAUX, Mayor:

DEAR SIR: I have the honor to acknowledge the receipt of your communication, requesting information in regard to the condition of this department. It affords me pleasure to furnish you with the following general statement of its affairs. The department is at present composed of one Chief Commissioner of Highways, two Commissioners, two Clerks, twenty-five Supervisors, six Watchmen of Bridges, and one Messenger.

All the highways, bridges, sewers, &c., are under the charge and supervision of this department. A statement in detail of the receipts and expenditures will be found annexed, marked respectively A and B. It will be seen that during the year 1856, the expenditures in this department, exclusive of damages paid for opening streets, amounted to $333,498 17; of which amount, $186,931 66 was expended up to July 16th, at which time I entered upon the discharge of my duties as head of this department.

By referring to the statement, it will be seen that during the latter portion of the year, although the work upon the public highways was continued up to December 25th, the expenditures amounted to but $118,542 37.

As the balance remaining to the credit of item 2, for repaving and repairing streets, was inadequate to

meet the expenditures which would have been necessary, had many of them been repaved, the attention of the department was directed to putting them in such a state of repair as the public exigencies required—and at the present time, with a few exceptions, they are in good travelling condition.

I regret to say that the practical operation of the system adopted for cleansing the highways does not give satisfaction to the public; nor does it receive the approbation of this department. The brief experience that has been afforded me leads to the conclusion, that a different one should be substituted for it.

The city is now divided into districts, and being cleansed by contract. The contracts having been in each case awarded to the lowest bidder. Competition for the work induced many to propose and engage it, who can only be made to comply with the terms of their contracts by incessant and continuous threats of prosecution, or of employing others to do the work at their cost. Others have bid for the work at very low prices, without any serious intention of engaging it, simply with a view of preventing responsible bidders from obtaining it at a reasonable rate of compensation. Probably under no system that can be devised will the streets be kept in such a condition as to prevent some persons from complaining, but under circumstances such as those referred to, it is certainly impossible to prevent them from being made.

It is made the duty of the Supervisors, by the ordinance organizing the department, to superintend and take charge of the men in the employment of the city in their respective districts; and their attention is especially directed to the repairs of the public highways. In the matter of cleansing the streets, they are unable under the present arrangements to render efficient assistance, as the men employed in doing the work are not subject to their control, and are not in any way recognized as employees by the department. The Supervisors therefore are compelled to listen to complaints which they have not the power to remedy, and the department is held responsible for grievances

which can never be thoroughly redressed but by a change of system.

Philadelphia has always been famed for the cleanliness of her streets; and I am persuaded that even at the present time no city in the Union will compare with her in this respect. It shall be my endeavor to leave no remedy untried to maintain this character for our city.

But it must be borne in mind that the contract price for cleansing streets, for the year commencing October 1st, 1856, and ending with October, 1857, is but about sixty thousand dollars for the entire city, being thirty per cent. less than was paid for doing the same work for the two last years, notwithstanding a very large area of paved streets has been added, and is embraced in the present contracts.

The cost of cleansing the city of New York, I am credibly informed, is annually about five hundred per cent. more than the amount paid here, although the area of its paved streets is not near as great as that of this city.

I would also call your attention to the matter of sewers and sewerage, as at present organized. This department is charged with the construction, repair and supervision of all culverts, inlets and drains. I am fearful that, at no distant day, the city will be put to serious inconvenience and great expense, as the system, in all its details, is very imperfect and defective; and I would add, also, that the ordinance upon the subject of drains from private properties into our culverts is equally defective with the system itself—so much so as to render nugatory all the efforts of the department to compel a proper observance of them.

I would especially invite your attention to this matter, and would suggest for your consideration whether it would not be well to recommend a complete revision of the system, and all ordinances appertaining to it, with the view of inducing such changes as would relieve this department from its supervision over them, and place the responsibility in a new department, or in one where it more properly belongs.

The officers of this department are about to commence operations to carry into effect the ordinance approved September 16th, 1856, entitled "An Ordinance to effect uniformity in the numbering of houses." It is made the duty of this department to furnish owners or occupiers of houses with the number by which the respective properties may be hereafter known and designated. This done, our duty ceases; and it then devolves upon the Police Department to see that the provisions of the ordinance are complied with. That a correct and uniform numbering of houses is very desirable, and that it will be found ultimately advantageous, few doubt—every effort will, therefore, be made to proceed as rapidly as possible; and due notice will be given your department, in order that it may be prosecuted in such a manner as its importance demands.

I regret that it is not in my power to furnish you with the number of paved and unpaved streets, with their measurement, or the length of culverts and sewers in this city. This could only be arrived at by a careful examination and investigation; and, with the clerical force engaged in the office at the present time, would seriously embarrass us, were we to attempt even an approximate calculation. Indeed, it would be a work of labor to ascertain the number of feet of streets paved and repaved during the past year, as the only statistical information in the office is the bills for materials and work done upon them. A record of matter of this kind should be kept in this office, for present and future reference; and I would willingly lend assistance, if additional force could be procured to enable me to accomplish it.

Yours, respectfully,

JOHN M'CARTHY,

Chief Commissioner of Highways.

A.

Financial Statement, Department of Highways, &c., for the year ending 31st December, 1856.

To Appropriation as per Ordinance approved 28th March, 1856, $360,500 00

Cr.	*Expenditures.*	
By Paving intersections,	$16,945	14
Repairing and repaving streets,	90,332	69
Grading streets and roads,	21,112	98
Repairing roads,	37,800	69
Paving footways,	4,836	04
Repairing culverts and inlets,	14,975	57
Repairing bridges,	9,915	79
Cleansing paved streets, markets, &c.,	82,430	04
Cleansing and repairing unpaved streets,	10,684	16
Repairing City Railroad,	6,022	10
Wells and pumps,	2,323	20
Salaries,	26,644	79
Girard avenue, 24th ward,	4,555	90
" " 20th "	175	88
Printing, stationery, &c,	1,290	92
Insurance on bridges,	1,100	00
Index boards,	200	00
Office expenses,	1,024	46
Incidentals,	1,127	82
Balance,	27,001	83
	$360,500 00	$360,500 00

Of the foregoing amount, there was expended up to July 16, when the present incumbent entered upon the duties of his office, - - - $186,931 66
And, subsequently, for work done and materials furnished prior to that date, the sum of - - - - 28,024 14

Amounting in the aggregate to the sum of $214,955 80

Leaving a balance of $145,544 20 for the remainder of the year, of which amount there has been expended $118,542 37; leaving a balance to the credit of the department amounting to $27,001 83.

Recapitulation.

To annual appropriation, 28th March, 1856, - - - - -		$360,500 00
Warrants issued prior to 16th July, 1856, - -	$186,931 66	
Warrants issued subsequent to July 16, for work done and materials furnished prior to that date, -	28,024 14	
Warrants issued for work and materials subsequent to July 16, 1856, - -	118,542 37	
Balance to credit of department, - - -	27,001 83	
	$360,500 00	$360,500 00

In addition to the above, there remain unpaid, for work done and materials furnished during the year 1856, bills amounting in the aggregate to over $3,000.

B.

Receipts of Department of Highways, &c., for the year ending 31st December, 1856.

From Licenses—		
Omnibuses, - - -	$4,980 00	
Hacks and private carriages,	972 50	
Carts, wagons, drays and barrows, - - -	2,397 50	
Hack drivers, - -	12 00	
Total from licenses, - -		$8,362 00
Permits—		
To occupy streets, - -	678 50	
To construct vaults, - -	1,150 75	
Total permits, - -		1,829 25
Sewers—		
Permits to enter, - -	1,870 00	
Annual rents, - -	2,139 80	
Fractional rents, - -	192 67	
Repairing over openings to sewers, - - -	479 50	
Total sewers, - - -		4,681 97
Railroad turnouts, - -	50 00	
Paving streets and footways,	2,933 36	
Miscellaneous, - -	2,114 89	
		5,098 25
Total receipts from all sources,		$19,971 47

SECOND

ANNUAL MESSAGE

OF THE

HON. RICHARD VAUX,

MAYOR OF PHILADELPHIA,

TO THE

SELECT AND COMMON COUNCILS;

TOGETHER WITH

REPORTS FROM THE MUNICIPAL DEPARTMENTS,

FOR THE YEAR 1857.

PRESENTED TO THE CITY COUNCILS.
January 8, 1858.

PHILADELPHIA:
PRINTED BY ORDER OF THE SELECT COUNCIL.
1858.

SURVEY DEPARTMENT.

The public know so little about the duties of this department, that I have requested from the chief surveyor a full report on the subjects committed to his charge.

The ordinance authorizing construction, and regulating the sewerage and drainage, should require the work to be done under the supervision of the Survey Department, in connection with the Commissioner of Highways. This will insure the proper preparation of the plans, and their being deposited in the office of the Surveyor for safe keeping and reference. The construction of drains at the expense of the property holders benefited thereby, should be encouraged, but in all such cases it is of great importance that the plans and surveys should be properly prepared and filed in the Surveyor's office for reference, because public and private rights are unitedly involved in their construction, location, and use.

DEPARTMENT OF SURVEYS,
Philadelphia, Dec. 31, 1857.

To His Honor, RICHARD VAUX,
Mayor of Philadelphia,

DEAR SIR:—I take great pleasure in presenting you my customary annual report, and in laying before you, in connection with my exhibit of the state of this department, some matter of general interest, bearing most particularly upon the subject of drainage, which I hope may meet the views of your Honor, and receive your official approval.

This department continues to increase in usefulness as a point of reference for our citizens, and our records have had large and valuable additions during the past year,—the Surveyors and Regulators of the Districts having, in connection with their ordinary duties, displayed great energy in the prosecution of the surveys outside of the built limits. The

Board of Surveyors have had unusually frequent sessions, called for by the large number of sectional plans that have been presented for their approval, each of which has received due examination on the ground. There have also been referred a large number of applications for privilege to construct private culverts, that have received their consideration, while the usual number of appeals have been entered and decided.

The expenditure of the department has been $23,264 79, being $6,529 71 less than the amount appropriated for the past year. Of this, has been expended for sectional plans of survey and regulations, over new district, and revisions of old regulations, $10,291 66. The extent of line regulations, completed in 1857, reaches near 130 miles of streets, and covers an area of about 3,800 acres. The plans on record it is impossible to define, with a view of exhibiting their value, being so various in their character, consisting of line regulations, grade regulations, drainage areas, culvert lines, culvert depths, sizes, &c., &c., bridge plans, wharf lines and soundings of river, old grants of supreme council, with records of surveys, and many others that cannot be enumerated, yet of great value.

This department being one which was entirely new at the date of consolidation, has required more time for the development of its purposes than others where the duties had been long established, and were consequently familiar to the community; which duties, I beg leave to remark, are not of that plain character that is supposed by those who have not examined the minutiæ or details of our work. They are not restricted to the mere arranging, recording and guarding that portion of the city archives which are placed in our especial charge, and are invaluable to our citizens, but extend to matters of great importance and responsibility, affecting not only the health, but safety of our community. Among the valu-

able records which are in our possession, may be found the details of the entire city plan, so far as surveyed, showing the street lines and surface gradients; and also the register of surveys made for individuals, exhibiting clearly and accurately, with ease of access, the locality and dimensions of each and every lot of ground that has been surveyed or regulated since our organization, with the official return thereof; upon the plans used for this record, which are neatly bound and classified for facility of reference, is being collected all information that may be of value to the citizen or property holder—such as the street summits and grades, with the elevations of each street intersection relative to tide; the position, depth, size and shape of all sewers or drains, with the location of inlets, manholes and ventilators, and, so far as practicable under the present inoperative system, all connections with sewers or drains for private drainage; and we are thus enabled to furnish all necessary data for deciding the frequent appeal cases that are entered, upon questions of party lines, and to give any advice and information that may be required upon the subject of drainage, whether for public or private use. There are many other duties that we perform, and which link us so closely to the Department of Highways, that but few know that our services have been called into requisition, yet, that the work has been done is evident, for while the Department of Highways is in fact the constructive department, the Department of Surveys is the engineering department, where all plans and specifications are prepared, whether for bridges, culverts or sewers, or whatever work of improvement may be directed, and where all estimates for said work are made when performed by contract: and it is gratifying, sir, to state, that the saving to the city, thus far—as can be testified by the Committee of Finance—has reached an amount equal to the salary of the chief officer for his full term of office. And I beg leave, sir, to remark this, in no vain boast, but, in con-

nection with defining our duties and their importance, it seems requisite.

That portion of our charge which requires the most mature deliberation and careful examination, is the arrangement of systems for drainage, with the proper proportioning of the sewers and drains constituting such systems, and has required a course of study and research that has been but little attended to in our city. It is a subject that has such a variety of elements within it, as to have rendered it a matter of close investigation for a series of years in the city of London, by commissioners appointed under acts of Parliament, the results of which are very voluminous, and furnish much practical information, from which may be deduced laws of great value on the question of waterflow in sewers; yet so widely do they differ from experiments on record, made upon a small scale—upon which our mathematical formulas have been established—that judgment must be exercised in their adoption, but we hope to make such experiments upon some of the most perfect of our own sewers, as will enable *us* to draw a comparison between their practical and theoretical value. Nevertheless, we have given the subject much consideration, and believe that the principles upon which we have arrived at the proper, tions of those sewers and drains already designed are correct, and will be found to be fully adequate to the purposes intended, yet with a strong hope that much saving may be made hereafter by a further reduction in the proportions of sewers for a given drainage. All the data requisite for preparing the necessary calculations for a system of drainage, over any water-shed within our surveyed limits, may now be found on record here—such as the average rain-fall—the character of the area—the extent of each water-shed—the quality of the underlying strata—the surface gradients and the inclination that can be obtained—all of which are requisite in determining the necessary plans, and which could not have been had

prior to the collection and arrangement of the records now deposited here and used for daily reference.

To obtain for our city an effectual system of drainage, is of the first importance, as bearing upon each individual of our community in a most vulnerable point, and without which all else is comparatively valueless—his health; and after general drainage, for which the city officials, in the minds of all, are responsible, private drainage presents itself; and as upon the first each and every good citizen sees and urges its necessity, so upon the latter we feel that too much cannot be said or written in bringing before you, sir, and the Councils of our city, the inestimable value that judiciously enacted ordinances would be, compelling the construction of underground drainage from residences. Ignorance and parsimony both now militate against our endeavors to introduce it, as the increase to the value of property and the additional comfort is as yet appreciated but by those who have adopted it, or have examined the matter sufficiently to understand it.

Some objection has been made to the yearly rental or charge for culvert constructions, but we feel assured that those who complain are not aware of the expenditure that is as certain to be required of the city, as that drains are constructed for private use, and that as the system of private drainage extends, we will begin to see the inefficacy of our old culverts, and either flushing or hand labor must be resorted to to preserve their usefulness, this duty has thus far been unnecessary, though many of our old culverts have now an amount of deposit that cannot be increased without soon giving evidence of the necessity for its removal. Fortunate are we, that as yet our water supply has not been restricted, for without it the best plan of culverting would be inoperative, and the preservation of that supply should be early considered.

The necessity of having all sewers or drains, whether for public or private use, constructed under the immediate charge

of city officers, and strictly in accordance with plans prepared by this department, I have fully stated in my previous reports, and sincerely hope that an ordinance, making such obligatory, will be enacted, and obtain official sanction.

Every facility should be offered our citizens to induce the construction of lateral culverts, and this, I believe, can be reached by enacting the ordinances now before the Chambers, the adoption of which is earnestly, yet respectfully urged. The great advantage in the introduction of lateral culverts is, not only that underground drainage from adjacent houses should be generally adopted, but that by the construction of frequent inlets, our gutters would cease to be reservoirs of filth and garbage, breeding disease and contagion in our very midst.

There should be a culvert on every street, and every house should be obliged to deliver into it, by underground channels, all ordure or refuse that is susceptible of being diluted. We would then find our bills of mortality reduced in proportion to the extension of the system. Our inlets should be placed at short distances apart, so that the rain flow, or storm water, should perform its work of cleansing on the surface without flooding, and by more frequently entering the culvert, with properly arranged junctions, the increased velocity of the current in the culvert, consequent upon such arrangement, would add greatly to the scouring effect, thereby preventing deposits.

Great difficulty has been experienced in this department, in overcoming the prejudice against the use of vitrified clay pipes for drainage, notwithanding the objections made are untenable to those who are familiar with the material of which they are composed—their advantages over our ordinary brick drains are many, and as to their being of sufficient strength to bear any superincumbent weight that would not be injurious to a brick drain, it cannot be a matter of question; their inner

surface being smooth, the accumulation of deposit is prevented, and their capacity increased, which admits a reduction in size, and in reducing the size, retaining the same rise and fall with the interior diameter of the old sewer as an element, we of course have an increase of gradient, and in connection with this subject, I beg leave to quote from an English report.

"It has been proved by the result of draining houses with tubular drains in upwards of nineteen thousand (19,000) cases, and by the trial of more than 200 miles of pipe sewers, that the practice of constructing large brick or stone sewers for general town drainage, which detain matters passing through them in suspension in water, which accumulate deposit, and which are made large enough for men to enter them to remove the deposit, by hand labor, without reference to the area to be drained, has been in ignorance or perversion of correct principles," "and are wasteful from the increased expense of their construction and repair, and from the cost of ineffectual efforts to keep them free from deposit." And they further state as a general conclusion, "That it results from the experience of works constructed upon correct principles, that improved tubular house drains and sewers of proper sizes, inclinations and material, detain and accumulate no deposit, emit no offensive smells, and require no additional supply of water to keep them clean," and further, That the method of removing refuse in suspension in water by properly combined works, is much cheaper than that of collecting it in pits or cesspools, near or underneath houses, emptying it by hand labor and removing it by cartage."

The conclusions thus arrived at after close scrutiny and extended investigation, should have great influence, and we can add that in all cases where they have been used at the suggestion of this department, the results have been highly satisfactory.

One objection urged, has been, that they are impermeable,

and therefore not effective in reducing the moisture of a springy soil; such is the case, and such we claim to be one of their greatest points for recommendation, and will say in addition, that neither do they accumulate deposits nor allow either liquid or gaseous matters to escape, impregnating not only the soil in which they may lie, but even the very atmosphere we inhale.

It is an indisputable fact that brick drains, which are necessarily absorbent and permeable, do not entirely carry off the vile and filthy matter that is carried into them, but cause the material surrounding them to become completely saturated with it, even to the surface, frequently causing putrid emanations as a nucleus for a devastating epidemic.

No culvert or drain for the conveyance of sewerage should be permeable, if the material through which it may be constructed should be of a moist or springy nature; permeable drains for that especial purpose should be laid. After the general principles for these subordinate systems have been arranged, the next point of equal importance is the minutiæ of the detail; and as their value is determinate by the correctness of their proportions and the accuracy of their lines and shapes and mode of laying, it is absolutely necessary for the successful operation of the whole, that the work should be performed under a responsible supervision.

The determination of the sizes and general detail should be exclusively in the charge of those who, from their position in the city government, may be deemed qualified to advise, and plans so arranged should be carried to completion under penalty.

Much cavil and questionings have already been offered at the supposed want of capacity in drains heretofore proposed, yet which, when constructed, have met the warmest approval.

The change in the proportions of drains, made in accordance with correct principles, from those heretofore laid by

"rule of thumb," is no doubt startling to the uninformed, and I again quote from our English brethren, whose experience and research entitle them to a degree of deference which we hope time will award us: "Proof of the empiricism and want of principle in the construction of works for the objects in question have been afforded as it were, by chance. Thus a six inch earthenware pipe having been laid down for the drainage of one detached house, the drains of one house after another as they were built were joined to the same pipe, until at the end of several years, this *one 6-inch pipe* was, to the surprise of both surveyors and builders, found to be clean, in perfect action, and carrying away the drainage of 150 houses, and doing the work, for which a sewer might have been provided of sufficient size for the entrance of a man to remove deposit." And an estimate of the value of a smooth surface in affording rapidity of current, is clearly illustrated by an instance reported in connection with the drainage work of the English town of Tottenham, containing about 10,000 inhabitants. It has been necessary there, owing to the want of a suitable outfall, to erect sewerage works for the deodorization of sewerage by chemical treatment, and consequently, the refuse is delivered into a pit, preparatory to its reaching the pumps; at the point of outfall it has been necessary to place a screen and an attendant for the purpose of clearing away rags, paper, &c., which would otherwise choke the aperture; at this point, a sufficient quantity of soap, in cake or lump, is found daily, to fully cover the expense of the attendant, proving that solids reach the outfall before decomposition or disintegration takes place.

It is with pleasure that I am enabled to report that the four main culvert lines which have been long needed, have been examined by this department, and are now under consideration by the Chambers of Councils; the location and sizes have been determined by the Board of Surveyors.

It is unnecessary for me to add to what I have said in reference to them, other than in expressing a hope, that the construction of two of them particularly, may be commenced at the earliest moment, and I allude to them particularly, on account of their construction being required for the interest of the city at large—the one being a valley line, collecting the flow now carried off by the Cohocksink nuisance—the other, an intercepting line to prevent the pollution of water to be used for distribution through our city, while the others, though equally important for their immediate localities, have not so large an interest at stake.

I might, sir, extend my observations upon this matter and its connections, but they would lead me to a greater length than would be at present justifiable, and which may have already been exceeded; such as the state of our old sewers, and the necessity of their lines of flow being adjusted, and flushing systems being adopted, as also the probability of recourse to deodorization and the preservation of sewerage for agricultural purposes being necessary, with the adoption of proper modes of ventilation, and others of equal interest, are subjects I desire to place before you, but will defer for future communications.

In conclusion, sir, I beg leave to express the hope that the assistance of our city authorities may be extended to this department, in its endeavors to improve, so far as susceptible, our present inoperative system, and in further investigating this subject as one of most vital importance to each individual of our community. We may then on our own authority, and with enviable confidence, present as the demand requires, effective, permanent, and economical plans which shall give evidence of their perfect working, in our increased healthfulness as a city, and the consequent elevation of character in the lower classes.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

I would also urge the attention of Councils to the matter of sewers and sewerage. It is absolutely necessary that provision should be made as speedily as possible for the construction of several main culverts in the localities of the city where they are much needed; in many places the streets are not only overflowed, but the cellars of houses upon the line of them are filled with stagnant water, and in consequence of this, property is depreciated in value, a stop put to all improvement, and the health of the people living in those districts seriously endangered.

A very large number of small culverts have been constructed during the year, mostly at the expense of the property owners, and as they have been built under special ordinances, it is a source of great trouble to the parties desirous of building, as well as a severe tax upon the time of Councils.

I would recommend that at as early a period as possible a general ordinance upon this subject should be enacted, in order that Councils may be relieved from the labor of considering, and passing upon each special case; that the department may act understandingly, and that the public may be enabled to construct them at their own expense, without entailing upon themselves the trouble and loss of time incident to the passage of every ordinance.

I would also call the attention of Councils to the fact, that under the ordinance regulating the prices to be paid to the district surveyors, much difficulty arises from the fact that some of them are disposed to give it a construction that would enable them to charge exorbitant prices for work to be performed, in some cases amounting to double the amount for giving the lines to set the curb in front of a property that is demanded by the curb setter for doing the work; difficulty having grown out of this, and the officers of this department having been embarrassed, thereby induces me to present it to Councils, as the property owners are under the impression that the fault is with this department, when in reality it is as much aggrieved by it as they are.

An ordinance authorizing the commissioners of this department to employ a surveyor to give curb, grade, or other lines, and also to measure work done by the city, which in case of non-payment by

the property owners must be liened against the estate, would afford a proper remedy, to be resorted to only when the district surveyor should fail to comply promptly with the requirements of this department.

In addition to this, all work done by the surveyor should be paid for by warrants drawn by the chief engineer and surveyor, as he is the proper person to scrutinize, and determine upon the accuracy of bills presented for work of this description.

In some districts the amount paid by this department to district surveyors, approximate very closely to the yearly salary of the Highway Commissioners, and as the surveyors receive a yearly salary in addition to this, it would seem to me proper that an appropriation should be made to the Survey Department to pay the surveyors for all work done for the city, as the head of that department can then very properly discriminate as to the work done by them, for which they receive a yearly salary, and that for which they are entitled to extra compensation.

The ordinances in regard to turn-outs for the different railroad tracks that are now laid through the public highways, need the attention of Councils. In the old city proper we have been acting under the ordinances enacted to provide for turn-outs from the city railroad, and in the few instances that permits were granted in the other districts, the same rules were adopted. Some of the railroad companies claim the right under their charter to construct them when and where, and as many as they please, and in addition to this would seem to regard it as a matter of duty upon the part of the city to pave between the tracks thus made, and keep the same in good repair. There being no general law upon the subject, leads to much difficulty and inconvenience, and in some cases to great danger, as the tracks having once been laid either with or without authority, are allowed to remain in an unfinished condition for months.

The public interests and safety demand that this subject should be settled in such a way, as that parties wishing to make turn-outs, may know the proper place to apply to, and that the *turn-outs* when made, shall not impede travel upon the public highways. The dif-

AMERICAN
SEWERAGE PRACTICE
VOLUME I
DESIGN OF SEWERS

BY
LEONARD METCALF
AND
HARRISON P. EDDY

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Some of the difficulties which the American designer of sewers, without professional treatises of much value and lacking the help of the professional societies and journals of today, encountered in the middle of the last century are set forth in a report by Strickland Kneass, Chief Engineer of the Department of Sewerage of Philadelphia, in 1857:

"That portion of our charge which requires the most mature deliberation and careful examination is the arrangement of systems for drainage, with the proper proportioning of the sewers and drains constituting such systems, and has required a course of study and research that has been but little attended to in our city. It is a subject that has such a variety of elements within it as to have rendered it a matter of close investigation for a series of years in the city of London, by Comissioners appointed under acts of Parliament, the results of which are very voluminous and furnish much practical information, from which may be deduced laws of great value on the question of waterflow in sewers; yet so widely do they differ from experiments on record, made upon a small scale—upon which our mathematical formulas have been established—that judgment must be exercised in their adoption, but we hope to make such experiments upon some of the most perfect of our own sewers as will enable us to draw a comparison between their practical and theoretical value. Nevertheless, we have given the subject much consideration, and believe that the principles upon which we have arrived at the proportions of those sewers and drains already designed are correct, and will be found to be fully adequate to the purposes intended, yet with a strong hope that much saving may be made hereafter by a further reduction in the porportions of sewers for a given drainage."

The foul condition of the streets of Philadelphia at that time, owing to the filth discharged or cast into the gutters, is evident from another quotation from the same report:

"There should be a culvert on every street, and every house should be obliged to deliver into it, by underground channels, all ordure or refuse that is susceptible of being diluted. The great advantage in the introduction of lateral culverts is not only that underground drainage from adjacent houses should be generally adopted, but that by the construction of frequent inlets, our gutters would cease to be reservoirs of filth and garbage, breeding disease and contagion in our very midst."

FIRST ANNUAL MESSAGE

ALEXANDER HENRY,

MAYOR OF THE CITY OF PHILADELPHIA,

WITH

ACCOMPANYING DOCUMENTS.

JANUARY 27, 1859.

PHILADELPHIA:

INQUIRER PRINTING OFFICE, 121 SOUTH THIRD STREET.

1859.

The expenditures of the Department of Surveys during 1858 have been $24,517 34. Under the direction of this department several small bridges have been erected for public highways, and very essential repairs have been made to the bridge over Gunners Run and to that over the Schuylkill at Girard avenue. Four main lines of culvert have been placed under construction in accordance with the ordinance autorizing the same, which will not only benefit the vast extent of property in their immediate vicinity, but must tend to promote the general health of the community. The construction of the culvert in the north-western part of the city, which is designed to drain the large area on the eastern side of the Schuylkill above its dam at Fairmount, is of special importance, as it will in a great measure prevent the flow of impurities from slaughter houses, manufactories and public buildings, into the body of water from which is taken that used for daily consumption throughout the city. Due regard for the purity of the water furnished to citizens demands the enactment of an ordinance prohibiting the erection of buildings in the vicinity of the Schuylkill above Fairmount to be occupied for noxious purposes, unless ample provision be made for the drainage of all impurities into culverts that shall empty them below the reservoirs. The system of municipal drainage is yet but imperfectly understood, and its great importance not sufficiently comprehended; but the ordinances of the last year relative to branch culverts, and providing for the new main culverts, must lead to its thorough consideration and perfection.

A plan recently prepared by the Board of Surveyors, for the construction of a bridge over the Schuylkill at Chestnut street, will be submitted at an early day for the action of Councils. The cost of such bridge, it is believed, will very far exceed the amount of $125,000, originally appropriated for that purpose.

SURVEY DEPARTMENT.

DEPARTMENT OF SURVEYS,
December 27th, 1858.

TO HIS HONOR, ALEXANDER HENRY,
Mayor of Philadelphia.

DEAR SIR:—I take great pleasure in complying with your note of the 18th inst., asking for a full, accurate, and detailed statement of the general condition of this department for the past year, with the amount of moneys received and disbursed, &c., &c., and beg leave to report, That the appropriations made to this department during the year 1858 have been as follows:

General appropriation of January, 11th, 1858,	$29,354 30
Special " of April 28th "	84 28
	$29,438 58
Of this has been expended, as will be shown in detail by the statement of the City Controller, - - - -	$24,517 34
Leaving balance unexpended, Jan'y 1, '59,	$4,921 24

The preparation of sectional plans of our city plat, has been conducted with energy by the Surveyors and Regulators in their respective districts; the following being a list of those which have been placed on record in this office during the past year, viz:

2d	section of	Chesnut Hill—lineal survey.	
8th	"	Blockley "	
6th	"	" "	App'd May 3, '58.
7th	"	" "	Exam'd by Board.
2d	"	Germ'n, grades and survey	Ap. Nov. 15, '58.
5th	"	21st ward " " "	May 3, '58.
6th	"	Germant'n " " "	
4th	"	21st ward, grades	Examined by the Board.
2d	"	Frankford, "	Approved Nov. 1, 1858.
3d	"	" " " "	"
4th	"	" " " "	"
		White Hall, " " "	"

1st	section	23d ward,	grades Examined by the Board.
2d	"	"	"
3d	"	"	"
4th	"	"	"
5th	"	"	" Examined by the Board.
6th	"	"	"
3d	"	Chestnut Hill, lineal survey.	
5th	"	21st ward, south of Erie avenue, grades.	
4th	"	Blockley, - - - -	"
	"	Between Susquehanna and City avenues and Forty-second and Fifty-first streets.	
10th	"	Blockley, lineal survey.	

The amount of work thus returned by the Surveyors may be estimated, when I state that it covers an area of 7,000 acres, with 250 miles of streets, extending beyond the built up portions of our city.

In the most of the survey districts, the plans on file and now under course of preparation, when completed, will extend nearly to the limits that may be considered necessary for many years, for all city purposes, and will guard us from the necessity of arranging our plans to suit artificial circumstances, to avoid excessive damages, rather than adopt what a judicious adaptation of the natural topography would suggest, so soon as this point is reached, the expenses of this department will be reduced to its minimum of salaries only.

During the past year the out-door business of the department has been more than usually called into requisition in matters of engineering; we have built a number of small bridges of different character, from the stone arch, to the simple girder truss, besides work for completion of structures unfinished when the city was consolidated, and repairs necessary from ordinary wear and tear, as well as from imperfect workmanship at erection, but will only allude to two.

At the bridge on Gunner's Run canal at York street, we have replaced one abutment, dilapidated from bad foundation, and the other must be taken down and rebuilt so soon as spring opens.

At the Girard avenue bridge, we have completed the very heavy retaining walls necessary for the filling and use of the approaches. This has been a work of greater magnitude than was originally anticipated, owing to the difficulty of finding suitable material upon which to base a wall of such dimensions, and at the same time, preserve as much of the old wing-wall as possible; it has been attended with imminent peril, but am happy in being able to report that no loss of life or injury of any kind has resulted therefrom. It would have been judicious and economical, on the part of the city, had we been authorized at the same time to repair the imperfect abutment at the western end of that bridge, as the foundation must be very defective, and if on rock, as is asserted, must be so shelving as to furnish but a poor ground work for the superincumbent weight of masonry. This is shown by the opening of the joints on the northern corner, and which, I fear, will ere long, render it imperative to have recourse to heavy expenditure for renewal, and even now, must be sustained by shoreing, to preserve it, and prevent the consequent destruction of at least one span of the superstructure, should the abutment fall.

The superstructure of this bridge was erected in the year 1853, prior to consolidation, and was not used for travel, other than foot passengers, until the winter of 1857, when the retaining walls on the eastern side were completed; though the western approach was yet incomplete, sufficient width of roadway was open to permit safe travel. Shortly after my assuming the duties entrusted to me by the city, I observed evidences of weakness in the structure, not from decay alone, and at the completion of the eastern approach, made a written protest against throwing it open for public use. But it was unheeded, until the evidences noticed and reported were, during the past autumn, rendered apparent to all by the arches of the eastern shore span breaking between the skewback and lower chord. Orders were at once issued by the highway department for their repair, and in doing so, every weak joint has been strengthened, and the entire bridge has been adjusted to its lines, both horizontal and vertical. We therefore now present it to the public as a

safe and secure structure. Much might be said in reference to the bridge, as to its injudicious location and consequent extra cost, but as it was before the time of our responsibility, it would be of no particular advantage. This bridge yet requires a suitable flooring, when a highway will be thrown into public use, that has long been required for the northwestern section of our city.

I am also gratified, sir, in reporting to you that the four principal lines of culverts, memorials for which have poured into the chambers of Councils for several years past, have now been allotted to responsible parties to construct, under such specifications and details of contract as will secure to the city the best character of work. These works, sir, I consider the most important of any that have been undertaken by our city for many years. Their results will not only be for the individual comfort of those residing upon the immediate lines thereof, who have been incommoded by the periodical freshets which have, in many instances, caused great loss of property, but will extend through our city in reducing the liability of disease, generated by the present state of the locality and the extension of epidemics for which the character of the atmosphere, particularly upon and contiguous to the line of the Cohocksink, is well fitted; for this, the construction of the Cohocksink line of culvert has been long required, as a reference to the statistics of the last cholera visitation will prove. The Vine street culvert will improve the character of property upon its line, and add to the city revenue, from increased assessment, sufficient to return to the city at an early day, the expenditure now authorized. The same result will follow the construction of the Moore street culvert, but to a greater extent, as in that case, the want of proper drainings, facilities has prevented the use of much vacant ground which will now be at once covered with buildings, returning its due quota to the city treasury.

The northwestern culvert is by no means of the least importance in the list, as by its construction on the line proposed we preserve the Schuylkill water from the deteriorating drainage flowing from a large manufacturing

district on the eastern side of the river, and it would be greatly to the interest of our community could an ordinance be issued to prevent the location of any stable, slaughter-house, or manufactory in such position that the refuse therefrom would flow into the water liable to be pumped out for city consumption. Such Act of Assembly exists, though reaching only to the south side of Francis lane, now Coates street, but should be extended up the river, and so framed as to guard each of the reservoirs for water distribution now located on its margin.

Another system of drainage to which the attention of this department has been called, but upon which I am not now prepared to present you a specific opinion as a result of minute examination, is that due to the area lying west and north of the Fairmount dam, in the Twenty-fourth Ward; as yet, much of the obnoxious matter is absorbed before it reaches the dam, as it passes mostly through an open and unimproved section; but judging from the advance of improvement in that ward, the day is not far distant when the drainage from that area will exceed in objectionable qualities that presumed now to flow from the eastern side.

It is a matter of congratulation that the subject of drainage has received so much consideration from the City Councils as shown by the appropriation of $200,000 for the works under contract, and the enactment of the ordinance authoring the construction of branch culverts or drains. The Board of Surveyors have already acted upon a number of applications which are now open for contract, and will be built without entailing any expenditure upon the city other than for intersections, and will greatly improve our street surface by enabling us to introduce a larger number of inlets, thus preventing the long surface flow which is so objectionable, and will also give opportunity to correct a very great evil in the form of cross gutters at street intersections. In all our new grade regulations we endeavor so far as practicable to avoid them, but of course the introduction of the branch culvert system is the only efficacious mode by which they can be prevented; many of those which now exist, and

which are not liable to be avoided at an early date by a branch culvert, should be remedied by the adoption of cast iron box gutters, extending across the carriage-way and foot-way, the expense of which would be returned to the community in the saving of time and a reduction in the wear and tear of vehicles. Those that have been introduced by the passenger railway companies constructed on Race and Vine streets meet the ends desired, but can be improved by being extended so as to close the gap now left at the curb.

The ordinance relative to branch culverts alluded to is of great importance in securing more thorough drainage, yet great responsibility rests with the Board of Surveyors in granting these permits, to avoid imposition upon a number for the benefit of a few, and it requires further guards for the protection of individuals, who from the necessity of their location or business are required to construct a branch culvert at their own expense; such persons should be protected from the indiscriminate use of such drain by neighbors who may have declined contributing only on account of the urgency of the case assuring them that it would be constructed by others, when they would be granted a permit from the city at a less cost than the price per foot of construction. This now prevents the extension of a number of branches; the board cannot authorize their construction under the ordinance, because in some instances but *one* owner's name is subscribed to the application, and its usefulness to the city is not such as to warrant its construction unless a majority of owners should request it, while the party applying is unwilling to build at his *own expense* unless he shall have an opportunity of remuneration from those who may afterward desire to connect therewith. For this we shall at an early day present a supplementary ordinance, trusting it may receive consideration from Councils and your approval.

I must again, sir, allude to the necessity of some system being adopted by which the connections made with our culverts for private drainage should be constructed under the immediate control of a city officer. Such abuse

of privilege as is now exercised by individuals will be severely felt hereafter, particularly as they increase in number, which is very rapidly; they oftentimes injure the strength of culvert-arch, and more frequently are arranged with a total disregard to anything beyond their immediate purpose and private ends, while the flow in the culvert is seriously affected, and each forms a nucleus for deposit, which must some day be taken out by the city at great cost. In the cities of Europe this is guarded with jealous care, and all connections at the culvert-arch are made by officers especially delegated; nor under the present system, has this department any means of knowing where or how such connections are made, and when called upon at any time to correct an existing evil are entirely ignorant of what has been done by the authority of other branches of the city government, while the proper location of such connections, and the effect thereof upon culverts opened, can only be known at this department, where each system of drainage is being minutely examined and recorded; in perhaps most instances, these connections, if properly and scientifically constructed, improve the working of the sewer, but if, as is mostly the case, the pipes are protruded into the area of flow without regard to the necessity of retaining a smooth and regular interior surface, and the debris occasioned by the unworkmanlike manner in which such insertion is performed, is left lying in the sewer, we cannot be surprised if we are at length called upon to cleanse our sewers by manual labor of the deposits thus created. Were it possible, and there is no apparent difficulty, for this department to have recorded all matters connected in any way with culverts, it would result eventually in great benefit to the city, and is particularly necessary now that the system of private drainage is becoming so universal in its application to new improvements.

The work that is now so urgently called for by a large number of our citizens, the bridge over the Schuylkill at Chestnut street, I am happy in being able to report, is now ready in plan for the action of Councils, the Board of Surveyors having given it close scrutiny as presented, and recorded their entire approval. The amount esti

mated for the construction of this work, seems to astonish those who are not familiar with such structures, and particularly as they have been somewhat misled from t e circumstance that $125,000 was appropriated by the "County Board" for that purpose, prior to consolidation, but forgetting that such was not intended to be the full cost of the structure that would be suitable for a highway for the City of Philadelphia, nor, in fact, do I know of any character of bridge that could be put up at that place for the amount thus specified, as the masonry necessary to the abutments, approaches and pier, would far exceed it in cost, and this cost would vary but little with the plan of superstructure, while the superstructure itself will not reach that amount by a large margin. Some have expressed surprise that a stone bridge was not adopted in preference to all others, and on this point I may say, that with the rise of arches and span which it has been considered expedient to adopt, so as to allow as easy a gradient as possible for the approaches, that a stone bridge is impracticable, and it has not been deemed judicious to interfere, more than is absolutely imperative, with the water way of river, by the adoption of two piers, on account of the great liability of seriously affecting the Fairmount works.

During the coming season, it will become requisite that a new bridge be constructed at Bridesburg, over the Frankford creek, at the United States Arsenal; that now in use is a sliding draw, and in a very dilapidated condition, entirely unsafe for travel, and is at best but a temporary affair, with trestle piers; the draw is decayed in all its parts, and is sustained by incessant patching, attended with considerable expense. The whole affair should be removed, and a swing draw substituted, with a stone pier and abutment adapted to the purpose. The city owning the property on the south of this location, there can be objection to the plan proposed, as the privilege to this swinging over the wharf property, can be reserved in case of sale.

As all questions of passenger railways must pass the examination of the Board of Surveyors, prior to their

construction, and the views of the board have differed somewhat from Councils, as regarding the gauge, &c., bringing out a regulating resolution from that body confining us to the first, and mayhap not thoroughly digested plan, I desire to say that the board were desirous of taking advantage of any improvements that might be suggested, rather than adopt a plan merely because it was then in use; and believe now, that many of the adherents to the present plan, clearly see that they would not have been affected, as they surmised, had the board been permitted to exercise some practical judg ent in the matter; had the gauge of 4 feet 8½ inches been adopted on some of the roads lately constructed, we would now have had Broad street, with its double track repaired, placed in thorough condition, and fitted for passenger travel, while the character of rail that would have been adopted for the new track, would have had the same and better advantages for ordinary vehicles, as they could have traveled upon it without injury to wheels, which is now unavoidable; this would also have prevented the combined rail o Second and Third streets, with the intricacy of castings in the carriage-way, that are now indispensable.

Although, in the organization of a new city government, much attention and time were given to the arrangement of the relative duties of the many departments composing it, yet we are by no means perfect, and much legislation is wanted, before this department can work in such manner as to conform in all points to law. Prior to consolidation, each district had laws relating to its surveys and records of property lines, many of which differed in form, some very materially, and although in some instances inoperative, yet for mere points of litigation, could be brought into argument with some force; all these should be adjusted, and a new form legalized, that would be simple and effective, and bearing upon the entire city, place us on sound and good ground for action.

The passage of an ordinance relative to the preparation of liens for unpaid bills due the city, by which the Surveyors and Regulators would be remunerated for the work required, most particularly in obtaining informa-

tion for the tax liens, is a matter of importance. The property against which the charge may be made is, in almost every instance, so obscurely described upon the bills, that it would be impossible for other than one familiar with the district, or possessed of records of survey, to locate it so that a proper description could be made out; the difficulty in identifying a property may be understood by an extract of bill as usually returned, viz: "J. Jones, a frame house on Fourth street adjoining property owned in 1854, by J. Smith, 6th ward." And in some instances thus: "W. Smith, lot of ground on the north side of Duke street, 19th ward," in a region, perhaps, where there are no improvements, and the only mode by which any information may be obtained, (unless some starting point may be possessed by the Surveyor, from his own records,) is by tracing up the name in the Recorder's office, a work exceedingly tedious, and frequently without any valuable result. The Surveyors and Regulators were not called upon to perform this duty until the ordinance of June 19th, 1857, carrying out the intent of the law, brought the tax bills into the hands of the Solicitor, and thus to this department, for the proper descriptions; and as we have distributed, since July last, 1400 bills, many of which require several descriptions, (in one case thirteen separate and distinct descriptions for one bill filed,) some idea may be formed of the additional work required, and justice seems to say they should be remunerated, particularly, as in all cases prior to consolidation, the Surveyor invariably received compensation for such duty.

It is also very desirable that an ordinance be framed by which the dedicating of streets to public use may be filed in some one place, and as this department is most frequently, and with propriety, called upon to verify the locality of public streets, they should, after being recorded, be deposited in this office, as custom, and what has been found to be most convenient and proper, has already made a precedent, and is particularly necessary now, as a resolution of Councils, approved November 20th, 1858, requires that the certificate from the Department of Surveys, shall be obtained as to the public ownership of a street,

prior to the laying of water pipes; such deeds, and many of value, are scattered through the several offices, notwithstanding we have endeavored to collect and file them for easy reference. If they were, in all cases hereafter, submitted to the Board of Survey for acceptance on the part of the city, and only made public streets subject to that approval, it might be of great advantage to our city plat.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
Philadelphia, January 2, 1860.

ALEXANDER HENRY,
Mayor of Philadelphia.

SIR:—In reply to your circular of 8th ult., I take pleasure in laying before you an exhibit of the operations of this Department during the past year. But before entering into the detail of works in progress of construction, or those completed, will state, that the amount of appropriation made to the Department of Surveys for the year 1859, was . . . $25,400 00
Amount expended, . . . 23,767 87

Leaving balance to merge, . $1,632 13

For the construction of the four large Culverts, viz: the Cohocksink (main and branch,) 24th street, (main and branch,) Vine street, and Moore street, an appropriation was made, payable by the Department of Highways, by a Loan entitled The Culvert Loan of . $200,000 00

The expenditures on which are as follows:

Cohocksink main, . .	$34,818 08	
" branch, .	18,141 39	
Twenty-fourth street main, .	37,793 01	
" " branch,	12,923 08	
Vine street, . .	15,187 75	
Moore street, .	15,554 24	
Total work done,	$134,417 55	
Less assessment bills, .	15,637 58	118,779 97
Unexpended balance, .		$81,220 03
Retained per centage in hands of City,		24,663 02
Amount of Loan on hand, .		$105,883 05

There have also been constructed during the year, 22,632 feet of branch culverts or drains, under the Ordinance of November 11, 1858, the aggregate cost of which has been not less than $25,400. Those that have been built under contracts made with the Department of Highways, we have full knowledge of, and have the exact cost of each on record, but those that are constructed by, and at the cost of individuals, we get no accurate return of, in all cases. These culverts require no expenditure on the part of the City; as, by the Ordinance, the contractors receive for pay, upon estimates made out in this office, culvert assessment bills against the property lying upon the line thereof, at the rate of 75 cents per lineal foot of property fronting thereon—and as the cost of the culverts constructed seldom reach that amount, a revenue is obtained for the City which, for the year 1859, will amount to $3,650 72; of which $2,934 42 in assessment bills have been sent to the Department of Highways. What amount of these, due the City, have been collected, we have no means of knowing, as they are placed by us in charge of the Department of Highways for that purpose, with the final estimate of culvert, when reported as complete by the District Surveyor.

The list of such branch drains constructed is as follows:

Three feet culverts,		4,871	feet in length.
Two and one-half feet culverts,		10,892	" "
Two feet	"	2,006	" "
Twenty inch	"	595	" "
Ten inch pipe drains,	vit'd clay,	4,214	" "
Eight " "	vit'd clay,	54	" "

The sectional surveys have been progressing at a rate that will, in a course of years, place on file a thorough and accurate record of the entire area embraced within our city limits. Those that have been entered during 1859 cover 6200 acres, with 220 miles of streets, making nineteen

separate and distinct plans, of which the following is a list

11th section of the late Township of Blockley.
12th " " " " "
13th " " " " "
3d " " " " of Bristol, 22d Ward.
2nd section of Chestnut Hill, 22d Ward.
6th " 21st Ward, grade regulations.
7th " " " "
8th " " " "
5th " Blockley " "
4th section of West Philadelphia, revision of grades.
Part of the 1st Ward, " "
6th section of Germantown, " "
7th " " " "
Portion of Blockley, South of Market street, lines and grades.
3d section of Chestnut Hill, " "
4th " Kingsessing, " "
5th " " " "
4th " 21st Ward, (Manayunk,) " "

The larger portion of the above plans have been examined upon the ground, by the Board of Surveyors, and the entire list will, in a short time, be presented to the Court for confirmation.

The meetings of the Board of Surveyors have been held more frequently than at the stated intervals, as much of their time has been consumed in the examination of petitions for branch culverts, each of which is placed in the hands of a committee, who report from personal examination, and thus far there have been but two applications that have not been sanctioned.

Much has been written relative to the want of proper drainage of our city, showing that but few are aware of the extended lines of drains that have been under construction during the past year—not only under the Ordinance of November 11, 1858, but by authority of special Ordinances.

In compliance with the latter, exclusive of the four arterial culverts first noted, there have been constructed 5,698 feet of sewers, and inclusive of special Ordinances and applications granted under the general Ordinance, the length of culverting completed during 1859, has reached 44,377 feet, or 8 4-10 miles. There are yet several miles of arterial culverts to construct, to relieve the outer sections of our built district, some of which are essential to preserve the high standard of healthfulness which our city has enjoyed, notwithstanding our citizens have profited so largely by that most valuable Ordinance of November 11, 1858, and at their own expense extended so greatly and advantageously by lateral drains the ramification of our drainage system. For this we have great reason of congratulation, and trust that the coming year will show a still greater extension, as the value and advantage of our projects become more evident and better understood.

It has been stated that the charge for culverts, under contracts made with the City, as directed in said Ordinance, is urjust, as in many instances the cost of the culvert has been less than the amount collected on the assessment bills, which places the surplus of charge in the coffers of the City—but instead of any injustice being inflicted, it is the only way of equalizing the charges, unless a resort be had to taxation upon the entire drainage area, the City then to perform the work complete, placing a drain in every street, for the basis of charge is made as the cost of a culvert 3 feet in drain—and all culverts, whether above or below that size, have the same charge—the justice of the charge then, is, that the circumstance of a person residing upon a line of drainage, that may require a culvert of large dimensions, should not inflict upon him an expenditure greater than would be made to a person whose property may accidentally lie upon a branch line—the larger one being, in fact, necessary to the operation of the smaller, the flow from the one

passing through the other, and they each, in fact, being part of one general system. The 10 inch pipe drain is just as useful for private, and even surface drainage, in its particular locality as a lateral, as is the 10 feet culvert on its line as a main.

In the construction of these drains we should have more careful supervision than they heretofore have had, and most particularly necessary is it for the pipe drains, which, if properly laid, are greatly superior to drains of brick, both in economy of construction and efficiency for drainage—but if laid without a due regard to the line, level, and proper joints, they become very troublesome. A general specification for each has been prepared, which, if complied with, will insure effective working. But this Department cannot be responsible for the manner of their construction; the duties of the office preclude the possibility of a personal supervision by the Chief Engineer and Surveyor, and there is no law directing such duty to be performed by the District Surveyors, they being responsible only for the lines and levels. We therefore depend upon the Department of Highways, under whose supervision the Ordinance directs that they be built. This should be arranged so that some one officer of the City may have the especial charge of the construction of branch culverts, and the connections to be made with sewers, under permits issued by the Department of Highways. This should be not only for the materials used, but that the specifications therefor be complied with. It is now customary for any one to knock a hole into a culvert, and insert a pipe, upon the granting of a permit by the Highway Department, careless whether the debris from the hole made remains in the culvert or not, or whether the pipe protrudes into the culvert, or is flush with the inner surface, as it should be; either of the first alternatives is bad enough, but in most cases I feel assured that both exist seriously, interrupting the efficacy of the sewer.

These connections from manufactories are without any restrictions as to the matter delivered into the culvert, and in many instances it is such as to entirely interrupt the ordinary flow, creating pools, from which the most offensive effluvia emanates, and which requires the full force of the storm waters to carry off. This should be prevented by Ordinance, and no material insoluble in water should be allowed to pass into the culverts.

During the past year a greater attention has been given than heretofore to the introduction of inlets for surface drainage. This is an important matter, and money so expended will give a good return in increased cleanliness of roadway and side gutters. Those built of late have had more care given them than has been usual, and by a new device which I have placed in operation, they are much increased in capacity; there need be no fear of overflows by the filling up of the sump; and if the inlet connection is properly arranged it acts as a ventilator as well for the inlet as the culvert. Had they been introduced upon the line of Reed street the late break and overflow would not have occurred. We have strong hopes that still greater improvement may result in the adoption of a patented inlet, to be constructed of cast iron, and if we are successful, the annual expenditure for repairs of inlets will be greatly reduced.

It is with great pleasure, Sir, that I am enabled to report, that the work upon the large culverts under construction, directed by Ordinance of February 27, 1858, has progressed with all energy, notwithstanding the many difficulties that have been met with. They were commenced early in the present year, and prosecuted through the most unfavorable season for such work ever known in Philadelphia, with close attention and unwearied energy. I say the *most unfavorable* season, on account of the unprecedented amount of rain fall that has occurred this year. The usual mea-

sure of a year's fall is a trifle over 40 inches, while during 1859, up to the 28th of December, it had reached 57 inches or more than was ever known in our City.

On the culverts for Vine and Moore streets, this excess of rain has effected the work most seriously, not only in delaying the progress of construction, but burdening us with expenditures, no human agency could forsee. The excavation upon these lines we found to be, for an extended distance, in material that with ordinary moisture became a lively quicksand so soon as disturbed, and the excess over the ordinary rain fall immeasureably augmented our troubles, and it has only been the determined energy of the contractors that has brought us safely through, *i. e.*, within any reasonable expenditure. This has not only increased the quantity and cost of material excavated, which could not be estimated by means of cubic yards taken out, but it has rendered necessary an enlargement in proportions of arch for culvert, to resist the different character of forces such material creates. On Vine street it forced us to abandon the ovi-form culvert with light arch, and substitute a circle with a corresponding increase of proportions—this was a matter of great regret, but deemed advisable for safety—it is now complete and in successful working order.

On Moore street the line was finished to a point 120 feet west of Seventh street, in August last, and would have been entirely finished several months since, had we not been compelled to cease operations from the circumstance of 627 feet of the line lying upon ground that had not been opened for public use. The slow course of law is in operation, and we hope now that at an early day we may be enabled to resume the work and hasten it to final completion.

This delay has been a matter of serious import, as one of the particular necessities of this culvert, is to relieve a locality from which this difficulty cuts us off.

Upon the Twenty-fourth street culvert a great amount of

work has been done. The principal difficulty here, has been the long rock cut required upon a closely built and narrow street, yet it is with pleasure I state that it has been successfully completed without injury to either person or property. At the intersection of Twenty fourth street and Pennsylvania Avenue, we have our deepest excavation, and it became necessary for economy, and to prevent the liability of interrupting the passage of trains upon the Reading road, to resort to tunnelling, notwithstanding the material is a clean gravel; it has been carried on with care, and would have been finished had we not have been flooded by the breaking of a large water main overlaying the tunnel, which filled a large extent of completed culvert with surface material. It has now progressed sufficiently to be free from danger, and a small heading driven to the line of open cut, has enabled us to commence work upon the Pennsylvania Avenue, west of Twenty-fourth street, as by this heading the water in the cut is permitted to flow off. The line on the Avenue is now completed to within 300 feet of Coates street, which when reached will divert the drainage now flowing into the forebay at Fairmount, into the new culvert line to be delivered into the Schuylkill at Wood street, some distance below the dam. North of Coates street, the rock excavation extends to Twenty-eighth street, and much work has been necessarily performed, to prepare for our culvert trench, which properly belongs to grading of highways, for we have taken out the easterly side of the Avenue to the confirmed grade. Immediately north of Coates street there is 250 feet of the culvert complete in the rock cut, and it will be pushed forward during the winter, so that a connection will be made with the line above Twenty-eighth street, now finished to Thirtieth street, early in the spring, and the branch running up to and draining the Girard College and the House of Refuge, now ready for use, will be brought into full operation. The extension on the line of the

Avenue, north of Thirtieth street, will be of small dimensions, and is intended only to drain the Lager Beer establishments near the Spring Garden Water Works, this can be built in a few weeks after the connection on the main line is made. This line in working order, the entire eastern shore of the Dam from Fairmount to the Girard Avenue Bridge, will be protected from City drainage, and the system carried out as the built district extends, will protect the entire shore to South Laurel Hill Cemetry.

The branch alluded to, is not only a part of the system for the protection of Fairmount, but it occupies ground that could not be brought into use for building purposes without it, and its completion prepares the valley of the "Dark Woods Creek" for the opening and filling in of streets, which will, at an early day, be sought as valuable building sites, thus giving a return to the City in increased taxation more than the interest of the cost for construction.

The most difficult work that we have had to perform, and which has occasioned the greatest anxiety, was the culverting of the Cohocksink Creek. From Germantown Road to Front Street there was much to contend with in the repeated freshets, that invariably broke away the protecting dams and required several days to place the work in the same condition it was prior to the storm; yet, notwithstanding this was so very discouraging to the contractor, it was driven forward with all energy, and every difficulty, as it occurred, successfully surmounted, and now presents for public use a fine, wide avenue, all trace of the former disgusting channel for sewerage having been entirely removed. The contractor, Daniel Stone, Esq., deserves at my hands, all encomium for the manner in which he has carried on this work, as well as for the character of the work now completed; and it has been a matter of great regret that he, by a serious accident, should have been compelled to yield his work into other hands. The contractors now in

charge—Messrs. G. & J. Clark—there is every reason to believe will prosecute the remaining portion of the work with the same energy and in an equally satisfactory manner; they are contractors of large experience, having constructed some of the heaviest work within our State, and in our own City have just finished the culvert on Vine street, built under the same authority as the work now in their charge. This culvert is now finished to a point 140 feet northward of Second street, with 2013 feet on Germantown road and Thompson street yet to build.

The branch culvert lying upon the line of the Cohocksink Creek, from Germantown road to Culvert street, is in charge of Messrs. D. & C. Kennedy, who have also the Twenty-fourth street main. This work has also suffered greatly from the frequent freshets, but it has progressed energetically, having received that attention and watchfulness which in this instance has been peculiarly requisite.

This work cannot be entirely finished until a connection is made upon the main line at Fifth and Thompson streets, thus enabling us to direct the drainage coming from Thompson and Mifflin streets to the channel projected for it on Thompson street and Germantown avenue. This is now carried in the old creek bed alongside of the new culvert, which is so guarded with piling as to protect it from injury, and at the same time give as much capacity as the creek had as an open channel, the flow in the culvert being more than equal that due the portion of original water course occupied.

Upon the completion of these lines we will ask for authority to complete the system by the construction of a four feet culvert on the creek from Culvert street to Apple street, the cost of which will not exceed $11,000, and will be more than covered by the unexpended balance of the Culvert Loan. The amount of the culvert assessment will be $2,015 00.

In connection with this branch culvert was a piece of work that deserves especial reference; that is, the alteration of the sewer on Culvert street, from the creek to Fourth street.

The old sewer on this line fell at so rapid a rate as to throw the mouth about four feet below the level of the bottom of the creek, and the same distance below the level we would require in bringing the new culvert up the creek from Germantown Road. This so contracted the opening of the old culvert at the creek as to occasion the repeated overflows at Fifth and Poplar streets, which, in many instances, has resulted so disastrously to the stores and dwellings in that neighborhood. This culvert it became necessary for us to raise to correspond with the new construction, and although located upon a closely built alley, of only 16 feet in width, and subject to the contined flow of drainage coming from 248 acres, as also the unusually frequent storms that occurred during the progress of the work: yet it has been completed in a satisfactory manner, without any injury whatever to the adjacent houses, though in some instances the cellar walls were bared to the foundation. The ordinary drainage carried off by this sewer is of the most offensive character, and it became necessary to employ a double set of hands for the purpose of relief, and thus expediting the work. It was necessary here to exercise the most watchful care to guard against the effect of a sudden storm, as a few minutes would change the flow from that of a rivulet to a mountain torrent, and in such cases it was imperative that all the obstructions to the free flow should be removed to prevent accident. Thus was it required that trunks, dams, and centering a part of the work, and in constant use, should be frequently removed, to be replaced when the storm had passed off. It is now entirely complete, and has been tested with as heavy storms perhaps as have ever visited the locality, such as have heretofore in-

variably flooded the valley at Fifth and Poplar and Parrish streets; yet it has carried it off entire, with only two-thirds capacity in use.

What effect the completion of these culverts will have upon the assessed value of property, may be estimated by comparing the condition of Thompson street from Fifth to Sixth, and Canal street from Germantown road to Front street, with what it was prior to the commencement of our work. But, in point of hygiene, no estimate can be made of the suffering by disease and loss of life that these constructions will be the means of averting. Now, there need be no fear attached to that particular locality, should an epidemic again visit us, as was the case some years since, when the line of the Cohocksink was marked by its ravages. This is its great value, and its success in consummating this much-desired end is by no one deemed problematical. Thus, the value of property on the line of the culvert is not alone enhanced, but the entire area over which the polluted atmosphere floated will feel the advantageous influence; and I cannot give a better idea of this than by repeating what has been previously stated by me, that in a similar case of improved drainage in a portion of the city of Manchester, England, the bills of mortality were reduced one-fifth, thus showing tangibly that the benefits from these constructions are not confined to a very limited area.

There has been but little work done the past year upon bridges, the only renewal being the construction of a spring draw-bridge over Frankford Creek at Bridesburg. This is of iron, and has applied to it the patent anti-attrition box of Parry. It is a permanent and secure structure, with greater facilities for the passage of vessels than was offered by the old bridge.

The Market Street Bridge, though without doubt one of the best wooden bridges that has ever been built, both in general plan and the proportion of its parts, and although

the material of which it is constructed was subjected to close inspection, yet it gives evidence of decay, and it has been requisite to replace a main brace and post. This has been caused, it is believed, by exposure from the want of outside boarding. I would therefore recommend that the entire structure be closed from the weather, by which further decay may be retarded.

The Girard Avenue Bridge, has been open for public use during the past year, and being upon the line that is used by drovers for large cattle, it has been severely tested and has proved to be as we have previously reported it to be.

The Wire Bridge at Fairmount, we believe to be in good order, but it is impossible to so assert unconditionally, as the parts are not so situated as to admit an examination. The western approach is in bad condition since the construction of the Passenger Railroad upon it. Great improvement might be made to this bridge, by re-arrainging the bearing plates upon the towers, and closing in the shore cables, inside the anchor pits; this would prevent the continued vibration of the shore cables, and reduce that of the bridge proper.

The Surveys of the outer districts have been progressing during the past year, as rapidly as the amount appropriated therefor would warrant. Those that are conducted under contracts, made by the Commissioners of Districts appointed prior to Consolidation, are drawing to a close. One of them (the contract) is now completed with the plans on file, and covers that portion of the 24th Ward, north of Market street, and west of the line of Fisher's Avenue. The other, east of Fisher's Avenue, will be completed, it is supposed, during the year 1860. There is but one other section of the City that is in charge of Commissioners of Survey, Passyunk Township, comprising a portion of the First Ward, of this we can offer no report, having been unsuccessful in obtaining the information sought.

The current business of the Department is steadily on the increase, requiring the constant attention of its officers, to keep pace with the requirements. The operation of the Branch Culvert Ordinance, has occupied much time, in preparing the estimates and arrainging the bills of assessment, all of which are recorded and on file. I would again call to your attention the necessity for an Ordinance specifying the course to be pursued, by parties who may desire to dedicate streets to public use, and guarding it, if possible, with such restrictions as will prevent the location of streets that may conflict with the proper planning of the City, there is now neither form nor law regulating this, and in some instances, the interest of the City suffers for the want of it. At present the filing of a recorded deed of dedication in this office, is all that is called for, to make a public street, no one being clothed with the authority to either accept or reject. An Ordinance now before Councils may correct this, which confides this duty to the Board of Surveyors, who probably are the only officers of the City who can, from a knowledge of the general plan, from a correct judgment, as to the advantages or disadvantages that may result from an acceptance.

The sectional plans of the City on file in this office, are so far as they extend into the rural district complete, except that portion of the old City east of Fifth Street. For this area, which is one of the most valuable in the Consolidated City, we have no plans whatever on record, and it is very important for the interest of our citizens, that a correct map thereof should be prepared, including the 5th and 6th Wards. We shall lay the matter before Councils at an early day, and trust that it may meet your approval.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

THIRD ANNUAL MESSAGE

OF

ALEXANDER HENRY,

MAYOR OF THE CITY OF PHILADELPHIA,

WITH THE

ACCOMPANYING DOCUMENTS,

January 31st, 1861.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
Philadelphia, Dec. 29th, 1860.

HON. ALEXANDER HENRY,
Mayor of Philadelphia.

DEAR SIR:—In compliance with your circular of the 10th inst,. I take great pleasure in presenting to you a full and detailed statement of the condition and affairs of this Department.

The appropriation made for the use of this Department for 1860, amounted to, . . $23,695 00

Expended for General Office and Salaries, ...	$12,484 06	
For Surveys, Extending the City Plot, ...	7,834 50	
For Surveys Revisions and other work, ...	1,446 00	
Balance to merge Jan. 1st, 1861,	1,930 44	
		$23,695 00

Surveys.

The work upon Sectional Plans of the City Plot, have been prosecuted during the year to the extent of the amount appropriated, and the following is a list of plans that have been filed in the Department during the year, the greater number of which have been examined upon the ground by the Board of Surveyors, and having received their approval, are ready for confirmation by the Court.

Plan
No. 156. 2d Sec. 23d Ward, app'd by Board, Jan. 3, '60.
" 157. 3d " " " " " "
" 158. 4th " " " " " "
" 159. 5th " " " " Jan. 16, "
" 160. 6th " " " " " "
" 44. Alteration of 32d St., approved by Board, Jan. 16, 1860.
" 166. 4th Div. W. Phila., and part of Blockley, approved by Board, Feb. 20, 1860.
" 163. Part of 21st Ward, app'd by Board Feb. 20, '60.
" 192. 7th Sec. Ger'ntown, " " Mar. 5, "
" 68. Regulations of Hope St., approved by Board, Mar. 5, 1860.
" 165. 3rd Sec. Chestnut Hill, approved by Board, Mar. 19, 1860.
" 171. 7th Sec. 23d Ward, app'd by Board, Ap. 16, '60.
" 172. 9th Sec. 21st " " " " "
" 173. 10th Sec. 21st " " " " "
" 19. 12th Sec. Blockley, " " May 7, '60.
" 167. 11th " " " " " "
" 169. 13th " " " " " "
" 72. Revision—Green Lane, approved by Board, June 20, 1860.

No. 175. Revision—part of 1st Ward, app'd by Board, July 18, 1860.
" 174. 11th Sec. 21st Ward, approved by Board, July 18, 1860.

The following is a list of plans filed during 1859, but not acted upon by the Board.

Plan No. 176. 5th Sec of Germantown.
" " 177. 8th " "
" " 178. 3d Sec. Township of Bristol, complete.

Passyunk Survey.

The survey of the lower section of the City, the late Township of Passyunk, being still in the hands of Commissioners acting under an Act of Assembly, without regard to this Department. I am unable to furnish any information relative thereto, other than, that the City has so far paid upon that work over $8000, and that there are bills outstanding and unpaid amounting to about $6500, and that for this $14,500 worth of work done, (which the City will probably have to pay,) there is no information whatever, either in shape of plan or memoranda, yet filed.

Branch Sewers.

The construction of Branch Sewers, under the Ordinance of Nov. 11th, 1858, has been continued during the year, but not to the extent that we reported for the year 1859, nevertheless, the advantage of house drainage is becoming more generally understood, and the increase in the healthfulness of the City as set forth in the health statistics warrants the assertion that it is mainly attributable to the improvement in drainage, and we t.ust that so convincing will these results be to our citizens generally, that the further extension of both Main and Branch Sewers will be of the first importance, and the construction of drains upon every square, with the necessary house connections for abolishing the use of cess-pools, will be one of the most advantageous applications; the value of house-drainage may be seen from returns on record; one from Lancashire (England) shows an excess of deaths in streets without sewers, over those properly drained, of 8 per cent. The average proportion

of deaths in our City prior to the year 1857 was 2 to every 100 per year for 1859 it was but $1\frac{6}{10}$ per 100, with a large increase of population, or 20 per cent. reduction, which is the best argument in favor of the extension of sewers, as lately constructed, that can be offered. Accompanying this, will be found a list of sewers constructed during the past year, from which it will be seen that $5\frac{16}{100}$ miles have been completed, 10,527 feet of which have been built, not only without tax upon the City, but in fact their construction has been a source of revenue to the amount of $832 77, irrespective of the annual rentage which increases with each sewer finished.

Inspector.

Great difficulty has been experienced in the Department from the want of a duly authorized officer of the City to superintend, and give continued inspection to the works as they progress; careful specifications are prepared and attached to all contracts, but we are compelled, generally, to depend upon the contractors themselves for carrying out the minutiæ; the District Surveyors are not paid for the time requisite for such inspection, nor will the accumulating business of the Department allow the time to any one employed in the general office. I would therefore recommend the appointment of an officer, whose duty it would be to inspect and certify, before payment, that all work done under either this or the Highway Department, has been completed strictly in compliance with contract and specification, or the directions of the proper Executive Office. This appointment would, without doubt, save much expenditure for repairs by securing good work.

Sewers built by Culvert Loan.

The Arterial Sewers, authorized by Ordinance approved February 27th, 1858, and paid for out of Loan created for that purpose, of date Oct. 1st, 1858, entitled "Culvert Loan," have all been successfully completed, and as we held a balance unexpended, after having finished the work so authorized, there have been added to the list of sewers constructed out of that loan, the following, viz.:

The Cohocksink Extension, from Culvert Street to Girard Avenue, . . .	1560 feet.
The Huntingdon Street from Lemon Street to Frankford Road, ...	1603 "
The Montgomery Street from Sixth Street to Broad Street, ...	3638 "
The Ninth Street from Montgomery Street to near Norris Street, ...	700 "
	7501 feet.

Being 1875 feet of 9 feet Sewer.
" 1603 " 7 " "
" 2179 " 4 " "
" 284 " 3 " "
" 1560 " 4 : 2 ⊢ 3 feet Sewer.

These are all now completed except the Montgomery Street Sewer, which will be finished in about thirty days, and will, we hope, yet leave a few hundred dollars of Culvert Loan unexpended.

The account with the Culvert Loan stands thus:

Amount of Loan, . . .		$200,000 00
Expended on Moore St. Sewer,	$11,779 45	
" Vine " " .	12,232 56	
Expended on Cohocksink Main Sewer, ...	50,132 26	
Expended on Coh'ksink Branch Sewer, ...	22,551 51	
Expended on Cohocksink Extension Sewer, . . .	3,795 60	
Expended on Twenty-Fourth Street Main Sewer, . .	60,118 61	
Expended on Twenty-Fourth Street Branch Sewer, . .	10,059 15	
Expended on Huntingdon St. Sewer, ...	5,253 25	
Expended on Montgomery St. Sewer to date, . . .	13,900 14	
		$189,822 53
Bal. on hand to finish Montgomery Street Sewer, and pay ret'd per centage, . .		$10,177 47

These sewers have been constructed under our own supervision, and we believe the work to have been well done. The change in the appearance and value of the sections of our City, so improved, fully warrants the expenditure, as the increased tax assessed upon properties, that otherwise could not have been improved, will more than pay the interest on the Loan created for that purpose, their value in a sanitary point of view, I regret, we cannot estimate at this time in a tangible form.

The total cost of these Sewers has been, viz.:

Paid by Loan, ...	$189,832 53
Paid by Assessment Bills, . .	36,615 52
Total, ...	$220,438 05

The Ninth Street Sewer is in fact an extension of the Cohocksink, being upon the line of drainage of the main branch of that stream, and prior to the commencement of our work, the natural surface was so situated, that no improvements could be made. Preparations are now in progress for extensive buildings operations in the spring. This sewer should be extended on Ninth Street 400 feet to Norris Street, and on Norris Street 230 feet to the Germantown Railroad; this at an approximate cost of $5000, will throw into the Market the whole of the low ground north of Montgomery Street and eastward of the Germantown Railroad.

Sewer Extension.

The necessity for the continued extension of the sewers, is daily becoming more apparent, particularly in the southeast and southwestern districts. In the southwestern, an Arterial Sewer of considerable extent will be called for, in all probability, the coming year, as the paved limits have been extending at a rapid pace, and a portion of the area is so arranged with surface gradients as to require underground drainage before improvements can be erected. I allude to that portion of our City lying east of Broad Street and south of South Street; the general elevation of this section is so uniform, as to require the adoption of basins, which, objectionable as

they are, are here rendered imperative, and until means are provided for their drainage, they will remain unimproved, but so soon as it is rendered suitable for residence by the construction of sewers, an area now in open common, will be covered with improvements that will add very greatly to the revenue from taxes.

In the southern district, extending northward as far as Federal Street, and west of the Passyunk Road, the want of drainage is a source of constant complaint. Here it will be necessary to adopt an arrangement of sewers different from our usual plan, on account of the low elevation of the general surface; and to provide an outlet, it will probably be necessary to resort to tidal sewers, *i. e.* a main sewer of large capacity extending across the low land, somewhere about the line of Oregon Avenue, and to open into both the Delaware and the Schuylkill Rivers at low water mark. It may be adjusted to have a continuous current in it, but that cannot be determined, nor can its location be fixed without careful and extensive examinations; but, it can without difficulty be arranged with flood-gates, so that they may be kept perfectly clean, by flushing at low-tide. I should recommend that this matter be a subject for examination at an early day, as at the present time we are precluded from constructing a sewer on Federal and Eleventh Streets, unless we deliver it into an area of drainage already charged to a safe limit. The Cohocksink Creek which has been, until the last year an objectionable feature of an otherwise valuable and healthful section of our City, has now been covered in entire between Front and Mifflin Streets. At Thompson and Mifflin Streets, this creek branches, the main stream coming from the north, lying upon Mifflin Street, which is covered in by a sewer to a short distance above Oxford Street, the other branch, coming from the west, being accommodated by the Thompson Street Sewer. On the main stream there is yet a portion not covered in, showing an *open channel for filthy sewerage*, from Oxford to Montgomery Street, a distance of 1150 feet intervening between what we term the Montgomery Street Sewer (nearly finished) and the Cohocksink Sewer totally completed. I earnestly

recommend that this be covered in at the earliest mo ment, for the healthfulness of that section, the approximate cost, exclusive of land drainages in opening Mifflin Street will be $11,000. The requirements of that section of the City now demand that Columbia and Montgomery Streets crossing the open channel, should be opened for public use from Fifth to Sixth Streets.

Inlets.

I would also call your attention to the necessity of having our Street Inlets more carefully looked after. In their construction a trap is formed to prevent the stench from the sewers polluting the atmosphere we inhale, which trap, often so fills with street washings, as to render the inlet entirely useless, this has partially been obviated by the introduction of a ventilator pipe, *outside the trap*, but it is not intended to be open, except in cases of emergency; it therefore very frequently occurs that the sumph of the inlets becomes so full of street detritus, as not only to reduce very greatly their capacity, but frequently close them altogether, giving an impression, to those not familiar with their construction, that the capacity of the sewer is too small. This should not be permitted, and a larger force should be employed, for the express duty of keeping the inlets in working order.

Obstructing Inlets and Sewers.

We should also have an ordinance making it a penal offence, for any one to deposit other than liquid matters into the inlets, or to allow substances insoluble in water to pass into the sewers through the connections allowed them by law. Another objectionable custom now permitted by ordinance, should be abolished, which is, the connections that are daily being made as drains from slop-pools or privies. This is rendering the air in our sewers most fetid, making it absolutely dangerous in every way, as the gases penetrate everywhere, extending even into the material embedding the sewer, and on account of this, it is impossible, in many instances, that any examination can be made with safety, of their interior. This liquid differs from the discharge from

water-closets, as the latter being greatly diluted passes off without injury; their use should be encouraged: in fact, could the whole system of cess-pits be discontinued, it would greatly improve the healthfulness of our City.

Sewer Record.

One of the most useful records kept in this department, is that of the location, depth, size, &c., of sewers, but it is as yet very incomplete, as there are many, particularly in the old section of the City, of which we can give no information. The continuation of the examinations, authorized a few years since, would be of advantage to builders, and would, without doubt, expose many imperfections in early constructions, that if now corrected at comparatively small expense, would prevent accidents of flooding, which have been attributed to a want of capacity in the sewer, and thus prevent heavy expenditure in constructing new lines of drainage, when the existing line may be entirely sufficient, if properly arranged. This, we believe, will be the result of an exploration made in the sewer at Fifth and Parrish and Poplar Streets, as well as the line of Parrish Street, where a new sewer had been deemed essential, at an expense of tens of thousands of dollars; yet an exposure of the defects in the allignment of main sewer, and the connections of branch lines thereto, we believe will give us data to correct the trouble long-complained of, at a trifling cost. In the matter of determining the sizes of sewers, we have even now no information that may be said to be entirely satisfactory, *i. e.* that will enable us to fix upon a minimum size of sewer with perfect confidence that our work will be successful, and for a want of information, we adopt formulæ of calculation, wherein we err on the safe side, for drainage purposes, but at the same time with an apprehension that we are extravagant in expenditure. Had we authority to institute a system of observations upon our sewers now in operation, the cost would be returned ten-fold in the saving that would be made upon the first large line of sewerage constructed. We are learning daily, but it is a branch of engineering that has been but little called for in this country, until

of late years, and in our beginning we profit as much as possible by the experience of older cities; but even they vary so much in their reported results, as the circumstances in all cases cannot be reduced to a common basis, that we are thrown upon our own judgment, and this we now ask may be assisted for the benefit of our city, by such information as can only be obtained under her auspices.

Chestnut Street Bridge.

It is a source of great regret that I cannot report more favorably in relation to the construction of the Chestnut Street Bridge. So far as municipal legislation is required, all has been done, but the conditions of payment are as yet undetermined by the difference of construction placed upon the law requiring the Philadelphia City Passenger Railroad to contribute to the expense of its erection. Yet we trust that before the winter passes all difficulties may be adjusted, and thus the time for its completion may not be unnecessarily delayed. In deciding upon the cast iron arch which was submitted by the Board of Surveyors, as a suitable plan for the bridge, some doubt was thrown upon the propriety of its adoption, from the circumstance that the bridge of Austerlitz at Paris had (as reported in a Paris guide book) proved an imperfect structure. For our own information on this subject (though the very many successful examples of similar structures gave us no anxiety) correspondence was had with M. Michael Chevallier of Paris, who with great kindness replied in full, stating "that no anxiety need be felt, from the fact that the Bridge of Austerlitz had failed, as it was constructed upon incorrect principles, and no astonishment was expressed, as, the cast iron of which it was composed *was not arranged to resist a crushing force*" (the only proper form for its application), and "that it *had not*, as had been stated, caused the French engineers to discontinue the use of cast iron for bridge purposes. On the contrary several very fine cast iron arches have of late years been erected by them, such as the 'Bridge of the Holy Fathers' at Paris, and one across the Rhone, between

"Beaucaise and Tarascon, both of considerable spans, "the latter of which, built by Messrs. Talabot & Martin, "compares closely with our proposed structure." The drawing and specifications for the masonry of our bridge have been prepared for some time, and we are now progressing rapidly with the details of the superstructure.

The Market Street Bridge is in good order, but should be weatherboarded, to prevent the rapid decay of its main supporting timbers.

The Suspension Bridge is in the same condition as reported last year. The western approach should be arranged, by raising the wing walls to grade level. The anchor pits should be built up, and the bearing points on the towers changed from a single roller to a bearing plate upon rollers, thus cutting off the vibrations of the cables more perfectly.

The Girard Avenue Bridge, though not used to the extent of the other bridges, is coming rapidly into use and is in good order.

The bridge over Gunner's Run at Richmond street, I report as now safe. The structure that has been *hanging* there for several years was peculiar in plan, and had become so insecure as to call imperatively for a thorough repair. It has now been completed by adopting the "Whipple Truss," using the old material as far as possible, and adding a new system of bracing with new end posts. Some of the other bridges over Gunner's Run are in very bad order, and should be repaired as soon as possible, particularly those on the line of Cumberland and York streets. If they are not soon adjusted serious results may occur.

Market Street.

I beg leave also to call your attention to the importance of increasing the capacity of the footways on Market street east of Eighth street. Their present width was arranged to suit the contracted cartways upon each side of the market sheds, but now that they have been removed we have one of the finest business marts that can be found in any city, and the widening, as now proposed, will greatly facilitate our business men in conducting the

extensive mercantile operations to which that portion of the street is devoted. To perfect this the elevation of the carriage way, as far at least as the tracks of the passenger railway, should be altered, and frequent inlets introduced to avoid the necessity of high curbs. This cannot be carried out until the railroad track to Dock street, belonging to the city, can be removed, as it now occupies a portion of the street that must be adjusted in surface; nor can this be disturbed until the Pennsylvania Railroad Company's trade is diverted from Dock street via Market street, after which there will be no necessity for any line of freight rails east of Eighth street.

City Railroad.

I also desire, in this connection, to call your attention to the changes that are about taking place in the railroad connections with our city that will very materially affect the revenue now derived from the City Railroad, and call for a consideration of the question, whether the interests of the city would not demand that the care and responsibility of the tracks occupying our streets for freight purposes, should not be transferred to the several companies controlling the trade which passes over them.

The changes I allude to are these: the Pennsylvania R. R. Co. are making an extension to the Delaware front by way of Washington Avenue, by which all the freight and emigrant business, now rating from Dock street, amounting, in 1859, to $3,424.25, will be lost. They are also about changing the location of their passenger depot from Eleventh and Market streets to West Philadelphia, by which, as per the receipts of 1859, $2,955.65 will be lost, making a total from the Penna. R. R. Co.'s business alone of $6,379.90 annually. Again, the Reading Railroad Company intend making a connection between their road and the Pennsylvania Railroad on the western side of the Schuylkill, which will change the current of the coal trade for local distribution, and will, by force of circumstances, drive all our retail coal yards out of Broad street to the line of Washington Avenue and Willow street. This will take from South Broad street the coal

cars of the Reading road, as well as the merchandise cars that now occasionally connect with the Baltimore railroad, and will reduce the receipts at least $1000 more, thus making a total loss of receipts of say $8,300 annually. The condition of affairs, then, may be shown by an exhibit of the business upon our City Railroad for the past five years, which shows that the receipts from tolls, &c, during that period (and this length of time is taken to cover more accurately the cost of repairs), amounted to an average of $12,523.23 annually; while the average expenditures during the same time, including repairs to north side of bridge, used by the railroad exclusively, was $8,275.01 per annum; giving a yearly revenue, from 1855 to 1859 inclusive, of $4,248.22. But as the repairs to bridge might be considered an extraordinary expenditure, and should, in averaging, run over a longer time than five years, we might fairly state the average revenue at $5,000; and then, with the loss of $8,300 of tolls annually, it shows that the road, *as now used*, could not be sustained without an annual loss to the city of $3,300, which we cannot hope to be made up by any probable increase of business in local freight. We will thus be forced to abandon the tracks east of Eighth street, and on Broad street, keeping only those on Market street west of Thirteenth street for the use of Penna. R. R. Co.'s local freight, and from Thirteenth to Eighth for the transporting houses located within that limit. From the business of the Penna. R. R. Co., transacted at Thirteenth and Market streets, we received during the year 1859, in tolls, $2,923.86; from the West Chester R. R. Co., $1,322.58, and from the transporters about $1000; making the total receipts due that portion of the line, between the bridge and Eighth street, $5,246.44. To do this business, it will be necessary to keep 2.79 miles of single track, which, for repairs on that street and salaries, has heretofore cost about $1,400 per mile, exclusive of repairs to bridge, or $3,906 annually, leaving a balance for revenue of only $1,340.44 per annum.

The removal of the tracks from Broad street will be of great advantage in relieving that magnificent avenue from an incubus that has prevented the erection of that

class of improvements upon its line to which its width and location justly entitle it; and it is a subject to be considered in a business light, whether the city is doing justice to herself in retaining this road upon Broad street, even with the present business. The amount of tolls received therefrom may be stated at $2,500 annually, as estimated by the Superintendent of City Railroad, and the expense for salary and repairs at $700 per mile of single track, amounts to $1,471; thus leaving for the annual revenue but $1079. Now if the tracks be removed, a large increase over this amount will be received annually, in increased taxation. This may be shown by the linear feet of building front between Vine and South streets, the assessed value upon which, for taxes, may be increased, it is believed, without objection from the owners, conditioned upon the removal of the railroad. Thus, there are between Vine and South streets, exclusive of public squares, churches, and property fronting on intersecting streets, about 6,300 linear feet of frontage; if upon this an increased valuation of $15 per foot be assessed in capital (being only 90 cents per foot per annum advance), we have, at 2 per cent. tax rate, 30 cents per foot annually, amounting in the aggregate to $1,890 per year.

If the city should determine to continue in the ownership and charge of the road on Market street, then the entire track retained should be remoddled as a permanency, and paved with cubical blocks on each side of rails; and this should be insisted upon as part of the transferring contract, should it pass into other hands.

Surveys—Old City.

I must again call your attention to the necessity of having proper sectional plans made of portions of the 3rd and 5th Survey Districts, *i. e.*, that part of the old city lying east of Sixth street, in part of the Fourth and the whole of the Fifth and Sixth Wards, and the old District of the Northern Liberties. Of the first we have no plans whatever, either for lines or grades; and for the last, the plans are of such early dates as to be mere skeleton drawings, of what is now probably the most densely

populated section of our city; and many of the now principal streets are not on record anywhere.

Hunting Park.

There is yet another matter that should at this time be presented to your consideration, which is the necessity of providing for the extension of those streets that are now intercepted by the Park upon York Avenue at Nicetown Lane. This Park is now in such condition that it may be squared without great outlay, and without injury to its plan, as it is not yet developed. Every year that this is postponed will add to the cost, and as the city extends toward it, the requirements of the public will demand that the street lines should not be interfered with. This could be done in the same manner that the lines of the Parade Ground, in the First Ward, have been adjusted, and by which the city has become possessed of valuable fronts, that in a few years will be greatly advanced in value over the amount paid.

Respectfully submitted.

STRICKLAND KNEASS,
Chief Engineer and Surveyor.

Sewers authorized and Built during 1860.

Location.	Built by.	Size.	Length.	Cost.	Returned to City.
Otis St., Richmond to Latimer Street	City.	2 ft.	522 ft.	$485 46	$275 42
Jefferson St. Eleventh to Marvine Street	"	2.6	200	256 00	
Seventh Street northward from Poplar Street	"	2.6	347.6	448 28	2 28
Marshall Street southward from Montgomery Street	"	2.10	936	1281 80	70 56
Second Street southward from Montgomery Street	"	10	231	242 55	73 49
Wharton Street, Fifth to Sixth Street	"	2.0	408.7	388 16	138 44
Susquehanna Av. and Second St. from Hancock to York St.	"	3.0	1318.0	1713 40	8 60
Coates St., Ridge Av. to Sixteenth Street	"	3.0	837.0	1046 25	
Second St., Norris to Berks St.	"	3.0	550.0	1544 27	12 70
Second Street, Berks to Montgomery Street	"	2.6	557.0		

Location.	Built by.	Size.	Length.	Cost.	Returned to City.
Bankson Street, Melon to Wallace Street	"	2.0	428.0	406 60	20 70
Wharton and Woodbine Streets, from Sixth to Federal St.	"	2.0	555.0	527 55	177 34
Eighth Street, northward from Girard Avenue	"	2.6	341.0	358 05	53 24
Spruce Street, Seventeenth to Eighteenth Street	"	2.6	475.6	689 03	
Fifteenth St., Coates to Barclay Street	"	2.6	216.0		
Ninth Street, northward from Poplar Street	City and Petitioner	2.0			
Lawrence St., southward from Culvert Street	Petitioners	10	60.0	no return.	
Hayes St., Sixth to Seventh St.	"	10	183.0	134 31	
Canal St., Lawrence to Thompson Street	"	3.0	312.0	390 00	
Pleasant Street between Tenth Street and Ridge Avenue	"	2.0	240.0	no return.	
Franklin Street, Girard Avenue and Poplar Street	"	3.0	702.3½	1053 37	
Second Street, Callowhill and Willow Street	"	2.6	189.0	166 75	
Sansom St., Eighth and Ninth Street	"	2.0	186.6	193 00	
Locust Street and Tin Alley	"	10	576.0	399 00	
Hamilton St. between Twenty-Fifth and Callowhill St.	"	1.6	140.0	93 50	
Chester St. between Race and Vine Streets	"	2.0	155.0	164 30	
Leithgow St., between Thompson St. and Girard Av.	"				
Market Street between Thirty-Sixth and Thirty-Seventh St.	City.	3.0			
Market St. and Forty-Second St. bet. Fortieth and Chestnut St.	"	3.0			
Twentieth St. betw'n Callowhill St. and Pennsylvania Av.	"	2.6	Authorized but not built.		
Wallace Street between Seventeenth and Eighteenth Sts.	"	2.6			
Hudson Street between Market and Chestnut Streets	"	2.6			
Total built under Ordinance Nov. 11, 1858, in 1860			10,716 4½		$832 77
Built under Special Ordinances in 1860			4,472.0		
Built from Culvert Loan in 1860			12,111.0		
			27,299.4½ or 5 $\frac{1.6}{10.6}$ miles.		

Bridges.

The outlay for repairs to Bridges, as shown in the table, will no doubt appear large. It will, however, be be borne in mind that in a large city like ours, covering as it does a large extent of unimproved property and farm land a very large number of Bridges are necessary for public use and need frequent repair. Many of the Bridges at this time, are in a dilapidated state and of doubtful strength, that make them almost impassable, and in danger of being washed away by an ordinary freshet. During the month of August last, when a severe rain storm took place, the Bridges in the Twenty-fourth Ward were very much damaged. In the upper part of the Twenty-first Ward scarcely a Bridge was left, while the lower part of the Ward suffered considerably. In the Twenty-second Ward, the stone Bridge over Cusham Creek was wholly washed away, and a new Bridge has been constructed at the same place at a cost of two thousand dollars. This condition of the Bridges in the above wards rendered it necessary that this department should promptly repair the damages, attention being first given to such as were most used by the public, other repairs were commenced and partially completed, while several Bridges have been left not touched, because of the appropriation to the item of Bridges, having been already exceeded. No person could form the least conception of the terrible and ruinous destruction of the roads and bridges in the above wards without having visited them.

Culverts.

On the subject of Culverts, designed as they are for permanent use and benefit, it may be proper to remark, that the mode and manner of giving out the contracts for their construction to the lowest bidder is most prejudicial to the strength and security of the Culvert, as it is to the economy of the City. There is no denying that the past has afforded abundant proof that contracts have often been awarded to parties to construct Culverts at prices that were ruinous to contractors, did they attempt

to make use of the best material and build them in the most substantial manner as they were required by their contract to do, and hence to save themselves from ruinous losses, imperfect material was used, and imperfect work was done. This was evidenced in several instances during the past year, where Culverts had fallen in, and especially at Fourth and Christian street, where the falling in of a Culvert carried with it an inlet and the intersection, which cost the City two thousand dollars to repair.

Then again, there is, in my opinion, a defect in the *construction* of branch Culverts or drains that should be remedied. Parties now petition to the Board of Surveys for a branch Culvert or drain to be made at some certain locality, parties thus petitioning becoming responsible for the payment of the same, while the City becomes thereafter the possessor. In many cases a ten-inch pipe drain is laid, while it is claimed that it will carry off as much water and offal as a two and a half feet culvert. From the experience of this office, however, I have reason to believe that this is an error, because of the frequent calls made at the office to visit localities where drains have become obstructed, and upon examination they were found to be ten-inch pipe drains, and the obstructions mostly discovered at the end of the drain pipe, leading into a culvert of three feet in diameter. It is sometimes necessary to take up the whole length of the pipe-drain, being no other means to examine it. Where an inlet is put in at the end of such drain, the dirt from the street very soon fills up the pipe, and renders both the inlet and drain of no utility. To obviate these difficulties, this Department would recommend the passage of an Ordinance to prohibit the laying of pipe drains in the street where the purposes are for drainage, and that a Culvert two feet in diameter be made that can be constructed for the same cost, while it will save to the City considerable expense for consequent repairs.

FOURTH ANNUAL MESSAGE

OF

ALEXANDER HENRY,

MAYOR OF THE CITY OF PHILADELPHIA,

WITH THE

ACCOMPANYING DOCUMENTS.

January 30, 1862.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
Philadelphia, January 8th, 1862.

To the HON. ALEXANDER HENRY,
Mayor of Philadelphia:

SIR:—As desired in your circular, I now lay before you a statement of the condition of this Department, with the expenditures for the past year, and other matters that may be considered necessary for the action of Councils.

Appropriation for the year 1861, . .		$21,650 00
Which has been disbursed as follows:		
Salaries General Office, . .	$5,800 00	
" District Surveyors, .	6,000 00	
Expenses General Office, .	946 27	
For New Sectional Plans, .	4,584 00	
" Revision of old Plans, .	539 00	
" Work ordered by Councils during 1861, . . .	175 88	
" Landmarks, (corner stones)	200 00	
" Examination of Culverts for Office Records, . .	101 50	
" Repairs to Wire Bridge,	1,590 41	
Balance to merge, . . .	1,712 94	
		$21,650 00

The Surveys for the regulation of the outer districts are all now drawing to a close, and if sufficient appropriation was furnished, all that are immediately necessary could be finished during the ensuing year, but as such cannot be expected, we can only proceed with the work to the extent of the amount of appropriation furnished.

During the past year there have been filed in this Office, as completed by the District Surveys, the following plans:

No. 72, Extension of Wood street, 21st Ward, approved by Board and confirmed by Court.

No. 182, Hermits' Lane, 21st Ward, approved by Board and confirmed by Court.

No. 166, Greenway avenue, 24th Ward, approved by Board and confirmed by Court.

No. 44, Revision of Grades at Thirty-sixth and Filbert streets, 24th Ward, approved by Board.

No. 99½, Revision of Grades at Washington avenue and Swanson street, 2d Ward, approved by Board.

No. 17, 6th Section, late Borough of Germantown, approved by Board.

No. 176, 5th Section, late Borough of Germantown, approved by Board.

No. 177, 8th Section, late Borough of Germantown, approved by Board.

No. 178, 3d Section, late Borough of Germantown, approved by Board.

No. 180, part of Holmesburg and adjoining, 23d Ward, approved by Board.

The Surveys that have been progressing under Commissioners appointed by Act of Assembly, or under contracts made by such Commissioners, have ceased. The first by an Act of Assembly of date May 1st, 1861, repealing the Act constituting the Commissioners for the Survey of Passyunk, yet no maps or memoranda have been filed as the result of their labors, although over eight thousand dollars have been paid them by the city. The Law Department of the city is about commencing such action at law as it is hoped

will place in charge of the city an equivalent for money expended.

The last contract existing, made under commissions, and covering a portion of the 24th Ward, has just been completed, and the plans on file.

Those surveys progressing under Ordinances of Councils, and in charge of the District Surveyors, are in a forward state, and are carefully examined upon the ground by the Board of Surveyors as presented.

SEWERS.

It is a matter of regret that the extension of our sewers has not been carried on as in the previous year. The Act of Consolidation, of date April 21, 1855, authorized the city to assess upon property lying upon the line of sewers, an amount not exceeding 75 cents per linear foot of front, which assessment was, by Ordinance, approved Nov. 11th, 1858, directed to be given the contractors building the sewers, in the form of certified bills, as so much cash paid for the construction thereof; and in the payment of all current estimates, these bills of assessment were received and collected at the expense of the contractor. This system worked well, and many branch sewers were constructed during the years 1859–60, in the aggregate amounting to 6.3 miles, but by an Act of Assembly, approved May 1, 1861, this authority for culvert assessment was repealed, and the construction of sewers was directed to be paid by general taxation. The result has been, that but 6,548 feet of branch sewers have been constructed during 1861, 1,355 feet of which have been at private expense. That some method should be adopted for the further extension of our sewers, is most desirable, and perhaps the best that can be arranged, as bearing most equally upon all, is to levy a sewer tax upon the entire water shed belonging to any sewer to be constructed. A plan for payment might be devised by creating a permanent loan, entitled the Sewer Fund. A sewer authorized by Councils could be paid for out of this fund, and the Board of Surveyors report

the exact limits of area that would drain into it. A sewer tax could then be laid upon the entire property embraced within this area, of such amount as would be necessary to cover all expenses of construction and collection. This, placed upon the ordinary tax bills, could be collected with the other assessments, and placed to the credit of the Sewer Fund, to be again used for other constructions. By this arrangement, the city would be but loaning the money to individuals most interested in having the sewer constructed. During 1861 we have disbursed the balance of the Culvert Loan, created to build the four great arterial sewers—Cohocksink, Twenty-fourth street, Vine street and Moore street. These, with several others, were completed during 1860, leaving an unexpended balance of the loan on January 1, 1861, amounting to $11,354 89 with which, during 1861, we have completed the

Montgomery and Ninth streets, at a cost of	$9,758 44	
Changes at Fifth and Parrish sts.,	1,596 45	
		$11,354 89

This latter was a portion of the proposed change intended to correct the overflows at that point, and which it was thought proper to test before subjecting the city to the expense necessary for carrying out the full plan, as, from the best authorities in our possession, we were led to a hope that the entire plan would be unnecessary. In this we were disappointed, and have now in progress an auxiliary sewer, tapping the Parrish street line at Franklin street, and passing by Franklin and Coates street to a connection with the old sewer at Fifth street. This will not affect the floodings at Tenth and Parrish streets, until a branch from it shall be carried up Brown street to cut off a portion of the excess now draining to Tenth and Parrish streets. Another important sewer is about completed in the late Borough of Manayunk, which it is hoped will prevent a recurrence of the damage occasioned by the storm of August, 1859, but cannot be fully efficient

until Levering street is placed in better condition for travel, and permits a division of the storm-water which now concentrates upon one side of the street.

Again must I call attention to the importance of having the private sewer connections made the subject of an Ordinance, so that they may be granted, in the first place, only when approved by the proper officers of the city, and then under proper restrictions as to traps, &c.; next, that their construction, as regards connection with the sewer, should be under the immediate supervision of a city officer, in fact, should be built by the city and charged to the owners. This would render the work secure and not injurious to the working of the sewer. They should all be recorded and noted in detail upon the plans of this Department for proper reference, and the rentals so arranged that the city may have the full revenue. It is believed that now the positions of a large number are not known. It would also be greatly to the advantage of the city, if an Ordinance be passed, directing that all buildings within a reasonable distance of a sewer, should make a connection therewith on plan approved by the Board of Surveyors, for water-closet purposes, and that no cess-pools be hereafter permitted, unless the sewer be out of reach.

BRIDGES.

The Bridges in charge of the city require greater attention than has been given them, and if the watchmen in charge were required to have accumulations of dust and dirt removed, which now retain moisture and generate decay, a greater durability of the woodwork would be the result.

The Girard Avenue Bridge again requires a comparatively small expenditure to prevent a greater at no distant day.

The Suspension Bridge has had an entire new roadway within the last few months, at a cost of $3,090 41, which, if some attention is given to its cleanliness, will be very durable, as all points of con-

tact of the floor beams and floor plank were, at the time of laying, covered with a hot mixture, making, in cooling, all the joints impervious to water. For want of appropriation, this repair is yet incomplete. The side railing, which is a "Howe Truss," adopted to reduce undulation in the floor, is now so much decayed as to render it useless for the purpose intended, and although it is not essential to the safety of the structure, yet the condition of the lower chord is such as to affect injuriously the new timber lately placed there. This should be renewed at the earliest day, at which time the cables and suspenders should be repainted. The cost would be about $2,000. The condition of the western approach to this bridge should be a matter for the immediate consideration of Councils. By the elevation of Bridge street to the established grade rendered necessary for the construction of the Hestonville Passenger Railway, and the improvement of the street at and west of the Pennsylvania Railroad crossing, the communication by vehicles with Bridgewater street, may be said to be cut off, unless the ascent from one to the other be made at imminent risk, while Bridge street, at the line of Bridgewater, is an unprotected embankment some fourteen feet high, offering a point perilous to all persons, whether on foot or in carriage. An accident there might cost the city a sum equal to that required to place it in safe condition, which would be from $10,000 to $12,000.

In my previous reports I have stated the necessity of protecting the Market Street Bridge from decay, by weatherboarding; but as yet it has not been done, and the result is, that a late examination of this structure found it in such condition as to be actually insecure; and had not the sustaining arches been perfect, it would have been a matter of no surprise if the truss had yielded to the large amount of heavy traffic continually passing over it. We are now repairing the north truss, and splicing the braces, the footing of many of which were so decayed, that a few months more would have rendered them entirely useless, and

the structure, if it had remained in position, would have been sustained entirely by the suspension rods bearing upon the arches. We are now introducing metal between the timbers at the joints, in such manner as to protect them from moisture, and make them more durable than heretofore; yet I must again ask that authority be given to cover in the trusses with weatherboarding. The south track floor will also require renewing during the present year, which should be done in the same manner as that adopted at the Wire Bridge. I would also recommend that a greater width be given to the south footway, as upon that side the entire travel of foot passengers is thrown, the north side being cut off by the necessity of crossing at each end the railroad tracks to reach it. The same remark relative to keeping the bridge clean, previously made with reference to the Suspension Bridge, is applicable here.

As regards the new bridge authorized to be constructed on the line of Chestnut street, after great delays we have succeeded in placing it under contract, and have commenced the masonry, but have been prevented carrying on the work with the energy we had hoped, by suits at law, which have been commenced against the project in the Supreme Court of the State.

In preparing the design of the bridge, as approved by Councils, there were several points which were considered as essential. First. That it should be an arched bridge, as having greater stability than any other plan and better adapted for such a highway. Second. The opinions of hydraulic engineers as to the necessity of placing as little obstruction to the flow of the current as possible, fearful of the effect upon Fairmount Water Works, caused the adoption of a single pier, notwithstanding it was an infringement upon all laws of architecture, and particularly as the point of location for the pier would be most favorable for secure foundation, and being assured by those navigating the river that their business would not be affected by such location. Yet objections and delays

have come from an unexpected quarter, and we are now working only to secure our coffer-dam, which might otherwise be destroyed, to great loss. The result of these suits, if adverse to the design adopted and approved by Councils, may require their further legislation. The stone accepted for the work, I am gratified to report, after an examination of a number of the most extensive quarries of our county, is obtained from the neighboring county, near Leiperville, where a strata of very beautiful fine-grained gneiss rock has been found, which, for strength and beauty, is not surpassed by any quarries at a greater distance, thus bringing the entire expenditure within our own limits, as the supplies from Lieperville are all obtained from our city. This was a point it was desirable to reach, and we happily have succeeded. The immediate charge of the work in progress has been given to Mr. James R. McClure, a civil engineer of large experience, whose scrupulous discharge of duty must commend him to all.

STREETS.

In the opening and improvement of streets this Department has had but the supervision of Market street, as being remodeled for a railroad street, and Delaware avenue in its widening under the Will of Stephen Girard.

In Market street the work is being done by the Pennsylvania Railroad Company, the cost thereof to be reimbursed to them by tolls; and, as proposed in my last report, the old track has been taken up entire, the Company crediting the city with the value of the material, and an entire new road superstructure laid with a wrought rail, in pattern similar to that used previously in cast iron, and which, from bad material, was found to be very objectionable, though several blocks laid in the same manner, with castings of different quality, are yet in use. Between the rails, as well as between tracks, and for eighteen inches outside, the cobble-stone pavement has been replaced by granite blocks, which pavement is found to be well adapted

for a horse path, and will make a durable surface. The blocks in width do not exceed four inches, and vary in length from five to eight inches. This pavement, we think, will be found to be particularly well fitted for our streets generally, as having the same durability without the objectionable features of the cubical block.

Upon the Delaware front one of the greatest improvements of the year has been in progress. From a carriage-way of twenty-one feet in width, and a foot-way of four feet, which were constantly crowded and jammed with the press of business, it has been altered to a fifty feet avenue, with a nine feet foot-way, and forty-one feet carriage-way, thus affording room for the transaction of business without the delay heretofore experienced. This improvement has increased the value of both wharf and store-house property, and is an additional monument to the munificence of Stephen Girard. We have just completed the work between Ton alley and Arch street, have under contract that portion from Arch to Vine street, and will shortly commence from Spruce to South street, the intervening blocks having been finished the year previous. When this work is completed there will be an urgent call for the extension of Delaware avenue below South street, at least as far as Queen street, the greater portion of which is now private property. Upon the contracts just concluded we have adopted the small size granite block for carriage-way, which we believe will be the means of their more general introduction in our city, and take the place entirely of the large square blocks, which are so injurious and dangerous to horses.

Respectfully submitted,

STRICKLAND KNEASS,
Chief Engineer and Surveyor.

DEPARTMENT OF PUBLIC HIGHWAYS.

OFFICE S. W. CORNER CHESTNUT AND FIFTH STS.

Philadelphia January 20th, 1862.

To the HON. ALEXANDER HENRY,
Mayor of Philadelphia:

DEAR SIR:—In answer to your communication of December 8th, 1861, requesting information in detail relative to the operations of this Department, it affords me much pleasure to be able to furnish you with the following statement of its affairs for the year 1861. The table marked A. will exhibit the receipts to have been fourteen thousand three hundred and twenty dollars ($14,320,) being a decrease of its estimated receipts of thirteen thousand six hundred and eighty dollars (13,680.) The table marked B. will exhibit the annual appropriation made to this Department, the amount expended on each item, and the balances that merged at the close of the year. In the discharge of the duties of my office during the past year, it was my earnest desire to keep the expenditures of the Department within the annual appropriation made by Councils, and am happy to say that I have succeeded. It will be seen that seven thousand and forty-two ($7,042) dollars merged, leaving in the office bills unpaid to the amount of four thousand two hundred ($4,200) dollars, by the refusal of Councils to make the necessary transfers before the close of the year. The general appropriation to the Department for the year 1861 was two hundred and seventy-two thousand four hundred ($272,400) dollars, which was fifty-nine thousand seven hundred ($59,700) dollars less than in 1860, and seventy thousand three hundred ($70,300) dollars less than in 1859; and by deducting the amount of bills unpaid from the general appropriation, would still leave two thousand eight hundred and forty ($2,840) dollars to merge. The special appropriations made to the De-

partment during the year amounted to sixty-four thousand one hundred and fifty-five ($64,155\frac{15}{100}$) dollars and fifteen cents, making the entire appropriations to the Department three hundred and thirty-six thousand nine hundred and fifty-six ($336,956\frac{15}{100}$) dollars and fifteen cents. The decrease in the estimated amount of receipts is to be attributed to various causes. Formerly there was appropriated to footway paving from ten to fifteen thousand dollars, and a portion of this outlay would be repaid to this Department by the property owners before liens were filed for its collection. But for the last year the appropriation for such purpose was but three thousand dollars ($3,000), besides which the general depression of business may have had a tendency to produce this result. With another year's experience in relation to the affairs of the City, so far as this Department is concerned, my views are the same as set forth in my communication to you of January, 1861, to which I most respectfully ask your attention.

Very Respectfully,
JOSEPH SHANTZ,
Chief Commissioner of Highways.

A.

DEPARTMENT OF HIGHWAYS.

Philadelphia, January 1st, 1862.

The following items compose the receipts of this Department for the year ending Dec. 31, 1861.

For Sewer Permits,			$610 00
" Repaving,			216 00
" Rents,			163 72
For Dray, Cart, Wagon, and Barrow Permits,			779 50
" Building	"		279 25
" Vault	"		100 00
" Culvert Bills,	"		73 70
Carried forward,			2,222 17

	Brought forward, . . .	2,222 17
For	Paving and repairing footways, . .	641 55
"	Hotel, Private, Hackney Coaches, and Drivers' Licenses, ...	292 50
"	Miscellaneous Receipts, . . .	1,819 31
"	Passenger Railway License, . . .	6,930 00
"	Omnibus Licenses, ...	75 00
"	Railroad Turnout, ...	60 00
"	Annual Sewer Rent, ...	2,280 10
		$14,320 63

B.

Items.	A. Appropriation.	B. Expended.	C. Balance.	
1	20,000 00	19,453 89	546 11	Paving intersections.
2	39,000 00	38,999 43	57	Repairing streets.
3	4,000 00	3,206 43	793 57	Repaving streets.
4	3,500 00	4,246 23	253 77	Repaving over water pipe.
5	12,000 00	11,995 11	4 89	Gutter and crossing stone.
6	40,000 00	39,978 29	21 71	Repairing streets and roads.
7	20,000 00	17,663 93	2,336 07	Grading streets and roads.
8	3,000 00	2,998 17	1 83	Repairing footway.
9	20,000 00	19,894 21	105 79	Repairs to bridges.
10	20,000 00	19,998 81	1 19	Repairs to culverts.
11	42,000 00	40,763 22	1,236 78	Cleansing streets and markets.
12	10,000 00	9,198 77	801 23	Cleansing unpaved streets.
13	2,700 00	2,693 59	6 41	Repairs to City Railroad.
14	1,500 00	1,500 00		Repairs to pumps and wells.
15	10,400 00	10,400 00		Salaries to Commissioner, &c.
16	15,700 00	15,650 00	50 00	Salaries to Supervisors.
17	900 00	494 92	405 08	Branch culverts.
18	1,200 00	1,199 90	10	Printing and stationery.
19	1,100 00	1,100 00		Insurance on bridges.
20	1,000 00	976 44	23 56	Office and yard expenses.
21	1,000 00	996 39	3 61	Incidental expenses.
22	400 00	399 50	50	Sign boards for streets.
23	2,000 00	1,550 73	449 27	Cleaning and repairing C. P. R'lway
	272,400 00	265,357 96	7,042 04	

FIFTH ANNUAL MESSAGE

OF

ALEXANDER HENRY,

MAYOR OF THE CITY OF PHILADELPHIA,

WITH THE

ACCOMPANYING DOCUMENTS.

February 19, 1863.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
PHILADELPHIA, Jan. 1st, 1863.

HON. ALEXANDER HENRY,

Mayor of Philadelphia:

DEAR SIR:—In compliance with your circular, I take pleasure in presenting to you an exhibit of the business of this department for the past year.

The appropriations made for our use during the year 1862 were as follows:

General appropriation		$22,540 00
Special appropriation	May 23	185 00
" "	Sept. 12	383 00
Total amount appropriated		$23,108 00

Which has been expended as follows:

For expenses of General Office	$7,386 66	
Salaries of District Surveyors	6,000 00	
New surveys (including corner stones)	6,504 34	
Revisions of old surveys	1,308 00	
		$21,271 00
Amount appropriated		23,108 00
Balance unexpended		$1,837 00

The surveys of the outer districts are progressing but slowly, and no time can be fixed for their completion, as that must be determined by the amount of appropriation furnished by Councils for that work.

The following is a list of plans completed by the District Surveyors during 1862, all of which have been carefully examined by the Board of Surveyors upon the ground prior to their approval, viz:

No. 42. Revision of grades, Second Section, West Philadelphia, approved February 17, 1862.

No. 43. Revision of grades, Third Section, West Philadelphia, approved February 17, 1862.

No. 142. Survey and regulation, Fourth Section, Blockley, approved March 3, 1862.

No. 150. Survey and regulation, Seventh Section, Blockley, approved February 17, 1862.

No. 164. Survey and regulation, Southwest portion of Moyamensing, approved March 3, 1862.

No. 170. Survey and regulation, Eighth Section, Blockley, approved March 3, 1862.

Widening Delaware avenue, Spruce to South streets, approved March 3, 1862.

Junction Railroad, Gray's Ferry to Belmont, approved April 21, 1862.

Philadelphia and Olney Railroad, Sixth and Diamond streets to Fifth street and Nicetown lane, approved April 21, 1862.

No. 153. Line and grade regulations, Fourth Section, Twenty-fifth Ward, approved November 3, 1862.

No. 186. Line and grade regulations, Third Section, Twenty-fifth Ward, approved November 3, 1862.

No. 187. Line and grade regulations, Second Section, Twenty-fifth Ward, approved November 3, 1862.

No. 188. Line and grade regulations, First Section, Twenty-fifth Ward, approved November 3, 1862.

No. 13. Revision of lines and grades on Pennsylvania avenue, from Coates street to Columbia avenue, Canal street from Minor street to Pennsylvania avenue, approved December 1, 1862.

No. 122. Revision of lines and grades on Spring Garden street, from Broad to Twenty-third street, approved December 1, 1862.

No. 65. Revision of lines and grades, vicinity of Cohocksink creek, east of Front street, approved December 1, 1862.

No. 191. Survey and grade regulations, Northeast of Holmesburg and Southeast of Frankford and Bristol turnpike roads, approved December 1, 1862.

No. 192. Survey and grade regulations, lying between Bridesburg and Holmesburg, east of Bristol turnpike, approved December 1, 1862.

No. 193. Survey and grade regulations, lying between Pennepack and Poquessink creeks, east of Bristol turnpike, approved December 1, 1862.

Our records are each year becoming more perfect as the plans of survey are extended. In the Twenty-fourth Ward we have nearly completed all that will there be required for many years. So also in the Twenty-second and Twenty-third Wards. The Twenty-first Ward has yet important ground to cover, but during the past year no extension of the work has been filed.

Among the most important sections that now require plans of record, is the old city, east of Seventh street. This should be carefully plotted at the earliest moment, as there is nothing on file by which lines or grades may be definitely fixed, should a question of law arise.

For general drainage, we have, during the past

year, constructed 9,980 feet of sewers, none of which have been main or arterial sewers; 7,406 feet of these have been paid for out of the general appropriations, and 2,574 feet by individuals.

As the condition of the drainage for the lower section of the city—taking Broad street as the centre—remains unchanged since my last report, I must again allude to the necessity of making such examinations as will be imperative before a general system can be fixed. It is more important now than last year, and will, with the rapid strides of improvement, force itself upon us before many seasons pass. The improvements upon South Broad street demand consideration; and justice to those who are investing so largely in that quarter would call upon us to be ready, at least when necessity impels. The drainage system that will be required for that section, I have before alluded to, and will only add that it must be carefully examined and well digested before a final plan can be presented to Councils.

In the northern section of the city, the line of the Cohocksink creek, between Montgomery street and Oxford street, is still an open channel, impeding improvements, and cutting off communication between Fifth and Sixth streets, for a distance of near 2,700 feet. This should be covered in as a question of healthfulness, and Columbia, Montgomery, Berks and Norris streets opened for public convenience. The upper section of this sewer should be at once extended from Ninth and Berks at least to the crossing of the Germantown Railroad at Norris street, by which we will have a guard against any recurrence of such a disastrous flood as happened on the 12th day of September last. As matters now stand in that locality, and existed at the date spoken of, the sewer has no opportunity of performing its full work, as, being unfinished, its mouth is at right angles to, instead of in the direction of, the line of the natural valley, and while the valley fills, even down to Sixth street, backing up upon the sewer at Ninth street, the water

passes into the mouth of the sewer only as a wier, having none of the advantages of current it would have with the opening in line of valley.

If this sewer were extended to the railroad embankment, and securely closed in at the bridge over the run, on the line of the railroad, we would have a safe embankment, which would retain there such a sudden accumulation of water as occurred upon the day above noted, and, sustaining it, give time for it to pass off harmlessly through the sewers. Had not the bank at Tenth street been newly made, and thus unfitted to bear the pressure of a depth of water equal its height, we would have been spared the disaster caused by the wave passing over that neighborhood.

This rain was unprecedented, and if it had been confined to the closely built section of the city, instead of the particular locality on which it fell—as its extent was very limited in area—we should have had flooded streets and cellars, but no accidents of the serious character suffered could have taken place; and, as a plain statement, I can say that this disaster was not the fault of a want of capacity in our sewers—as none of them were materially injured—but from the fact that at the Rising Sun road, an old sewer of small capacity erected by an improvement company on their own land, stopped up the water-way of the bridge; this caused the valley above that bridge to fill, so that the water ran over the guard walls as over the comb of a dam. Its pressure finally blew up the old sewer, and allowed the water to pass through the bridge arch under a head of some twelve feet, which, with the consequent scour, soon undermined the abutments and destroyed the arch. So soon as this took place the mass of water thus relieved rushed upon the bridge at Broad street, where the same cause produced a like effect; *i. e.*, the water accumulated, on account of the break above, with such rapidity that the opening under the street could not carry it off, and it again backed up, and again, with its resulting scour, destroyed the abutments by undermining them, and threw down the

arch. This then brought a torrent of water into the valley west of Tenth street with a velocity proportional to the head or height backed up on the west side of Broad street. This, of course, could not be carried off at once by a sewer not proportioned for such accidents, consequently it piled up against a newly made embankment of earth, and, saturating it by percolation, soon destroyed its power to sustain the weight, and, with a *rush* and a *wave*, it passed on down to the built portion of the city, but was delivered entire into the creek east of Tenth street, through the Cohocksink sewer. The sewer at Tenth street stood uninjured, and had the bridges at Rising Sun Road and at Broad street been built with a counter arch, similar to the Tenth street sewer, I feel confident no trouble would have ensued.

In this way were all the railroad bridges destroyed through that section of the city north of the Cohocksink drainage, extending even to the northern boundary in the Twenty-third Ward. To repair these bridges, as well as those which from ordinary wear required renewal, before the frost rendered a suspension of such work necessary, has called for energetic work on the part of the Highway Department. They have been completed by that department in accordance with plans, &c., from this office, and I believe they are substantial and secure. The stone arch, with enlarged openings, has been adopted, except in a few instances, and where a change of location may in a few years be necessary. The cost has been greater than heretofore expended for such work on account of the scarcity of mechanical labor and the season of short days. The foundations have all been troublesome and costly, owing to the scour before described; as in many instances where the stream at bridge site had a depth of channel of only about two feet prior to the freshet, there is now a hole varying from nine to twelve feet deep, in which at least part of the foundation must lie.

Near Frankford we have considered it safer to give an open water-way, by constructing truss bridges of

wood, (to be replaced with iron hereafter,) than to risk again the undermining of an arch, with its sudden release of water and resulting damage upon the built section immediately .below. As providing sewer area in our city for such a storm is a subject still under consideration by the department, we are not at this time prepared to submit any project.

The present sewer was never intended to carry off the whole drainage from the upper Cohocksink valley, as is stated and explained in report of this department of April 5, 1856; but another sewer was therein projected on the line of Norris street, yet it was not deemed requisite until that section of drainage area west of Broad street should become paved and built upon; nor is it now, except for *accidents* similar to that still fresh in our memory, and it is questionable to me whether, in any human probability, such accident will occur again. It is an important question, full of interest, requiring time and research, nor should it be hastily determined, as upon the conclusion arrived at may result the expenditure of a large amount of money.

The bridges of our city have not that care which their importance requires. I allude particularly to those over the river Schuylkill. They should be swept *sometimes*, so that masses of mud should not accumulate, to retain moisture, and soon by rot destroy the timbers.

The Girard Avenue Bridge should be newly floored, and protection railings placed upon the retaining walls upon both sides.

The Wire Bridge needs a new trussed railing, and the western approach placed in safe condition for travel, with proper protection for the anchorages and shore cables, as suggested in previous report.

The Market Street Bridge, for the want of proper protection by weather-boarding, has required extensive repairs; and when the main braces were renewed, a year ago, it was in such condition as to well terrify those of us who appreciated the danger. In that re-

pair we endeavored to protect the joints by inserting sheet lead between every brace footing and its shoulder on post, but the want of proper watching has enabled thieves or malicious persons to tear off the lead at some points. The watching and cleansing should be more carefully attended to. The southern roadway of this bridge should be renewed at an early date.

The Penrose Ferry Bridge, which has lately come into the possession of the city by purchase, should be strengthened, as recommended in the report heretofore presented.

The Chestnut Street Bridge, which is now under construction, has been progressing as rapidly as we could hope for under the difficulties of procuring proper labor. The two main abutments are now within a few feet of the springing line of arch, as also is the pier and abutment of the approach arches on the eastern side. The retaining wall between the approach abutment and Twenty-fourth street is well advanced, and the pile foundation on the western side nearly ready for the stone work. The crib for the centre pier in river is in place and at the opening of spring will be ready for the masonry.

At my last report I had every hope that we could obtain sufficient stone for the face work of abutments and piers from our own neighborhood, but we soon found it impossible, not on account of quality—as it is very superior, both in grain and durability—but it could not be delivered in sufficient quantity to keep the work in active progress. It was therefore necessary to obtain all the face stone from the coast of Maine. It is hard and durable granite, but in appearance not equal to that from Leiperville. The character of work done we believe to be superior to anything that can be found in this country on bridge work, and I am much indebted to my assistant engineer, J. R. McClure, Esq., for the constant attention he has given to every detail of the work.

The iron work for the superstructure is in an advanced state, some 430 tons having been cast, and is

now ready for the finishing tools. We hope to have it placed upon the masonry during the coming summer. The character of the castings is very satisfactory.

At the last session of the Legislature an act was passed authorizing this department to prepare records of the opening of streets and roads, as also of the warrants, surveyors' returns, and descriptions of lots and land within the city of Philadelphia. This work is progressing, and will make a record of most important information, and of great value in establishing titles. The record now, in its imperfect state, has been of great value, and is used for frequent reference in fixing public highways. Its real importance will be better known as it advances to completion.

The widening of Delaware avenue has been progressing satisfactorily, and as soon as spring opens the work of completion will be commenced, and in a few weeks after a fifty feet street, with a forty-one feet carriage-way, will extend along the entire city front, from South to near Poplar street. The advantages of this wide avenue are not really felt, from the fact that property owners seem to forget that the extra width of twenty-five feet is extended for public benefit, and therefore use it as storage space. The paving on the avenue alluded to in my last report as experimental has proved a success, and its more general adoption would be advantageous, both in point of economy for repairs and comfort to those driving over it.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF PUBLIC HIGHWAYS.

OFFICE S. W. CORNER CHESTNUT AND FIFTH STREETS,

PHILADELPHIA, January 13, 1863.

TO THE HON. ALEXANDER HENRY,

Mayor of Philadelphia:

MY DEAR SIR:—In compliance with your request, I respectfully submit a statement of the receipts and expenditure of this Department for the year 1862.

Table A exhibits the receipts amounting to eighteen thousand two hundred and one dollars and thirty-nine cents.

Table B exhibits the several appropriations, the transfers, the amount expended on each item, and the balances which merge.

It having been my desire to keep within the appropriations, I used the utmost vigilance to restrain unnecessary outlay; however, with all the economy I could practice, it was altogether impossible for me to come up to the public requirements on item No. 3, (for repairing streets) without the additional appropriation, as the amount in the general appropriation was inadequate to the purpose; in respect to the other items, except those affected by the freshet, I have succeeded in keeping within the limit.

The small amount appropriated for repairs to bridges in 1861, compelled my predecessor to withhold the repairs from many which were left in a dilapidated and dangerous condition. (See Appendix to Journal of Common Council, page 366, 1862). These have been repaired, and charged to the appropriation of 1862.

The freshet which occurred last spring damaged several inlets, culverts, and bridges, which have been repaired at considerable expense, while the great freshet in September destroyed many of the bridges in the 20th, 21st, 22d, and 24th wards, and nearly all the larger ones in the 23d Ward; and in connection therewith much private property, exceeding in value the cost of their reconstruction. The torrent of water was so great as not only to destroy the arches and superstructure, but in many cases it swept away the foundations, and deepened the channel several feet, thereby rendering their reconstruction much more expensive than the estimate based upon a hurried examination indicated.

There were comparatively but few of the large sewers injured, and those only in sections where the streets were unimproved, and where the surface water had not adequate ingress. Many inlets were injured as the result of their imperfect construction.

Upon examination I found most of the bridges had been built in a very improper manner, presenting a smooth and handsome face, but destitute of strength. The stones of which, in some instances, they were constructed were suitable only for cellar walls of an ordinary house, but too small for bridge purposes. In many cases the entire face did not show a single tie, and might properly be termed veneered.

This false system of economy finds no favor with me, and as these bridges are intended to be used for an indefinite period of time, I deemed it proper and economical, under the advice and direction of the able and efficient Chief Engineer, Strickland Kneass, Esq., to use the largest stone and best material that could be procured, although at greater cost, with a view to permanency.

To secure the completion of this work at the lowest possible expense, I have selected a skilful man to superintend the construction of each bridge, who is required to take a solemn obligation to make a true and

correct return of all material used and labor performed, thereby presening every safeguard that I could devise to protect the City from excessive charge, fraud, or peculation. A number of the bridges have already been completed, and the others are in progress of construction, and will yet require considerable outlay to finish.

In the latter part of the season, Councils directed the repaving and repairing of certain streets, to meet the expenses of which I asked for a transfer to those items equal in amount to the cost thereof, but in consequence of the delay in acting upon the resolution, the season for such work had nearly passed, and a portion of the work could only be done, and, therefore, the balance will merge.

Respectfully, your obedient servant,

JAMES LANDY,

Chief Commissioner of Highways.

(A.)

Receipts from January 1 to December 31, 1862:

Licenses for Passenger Railway Cars	$9,390 00
" " Wagons, Carts, Drays, &c.	1,028 75
Permits for Building	285 00
Licenses for Hacks and Carriages	448 00
Rents of Sewers	2,475 17
Permits for Sewers	1,502 00
Repaving	467 00
Permits for vaults	586 80
Licenses for Omnibuses	30 00
Permits for Turnouts	70 00
Miscellaneous Receipts	1,926 67
	$18,201 39

(B)

Statement of Highway Department for 1862.

An Ordinance making an appropriation to the Department of Highways for the year 1862:

March 17	$26,5450 00
July 7	1,500 00
October 16	25,000 00
" 16	18,934 57
September 29	55,000 00

Items.		Amount Appropriated.	Amount Countersigned.	Balances which merge.
1. Salaries of Commissioners, Clerks, Messenger, Watchmen of Bridges, and Superintendent of City Railroad		10,800 00	10,789 17	10 83
2. Paving intersections of streets	15,000 00			
To Transfer Dec. 17	5,000 00			
		10,000 00	8,014 48	1,985 52
3. Repairing streets	39,000 00			
By Ordinance Oct. 16	18,000 00			
By Transfer Dec. 17	3,600 00			
		60,600 00	56,082 57	4,517 43
4. Repaving streets	5,000 00			
By Ordinance Sept. 20	4,000 00			
By Transfer Dec. 17	4,000 00			
		13,000 00	10,492 79	2,507 21
5. Repaving over water-pipe	5,000 00			
By Transfer Dec. 17	400 00			
		5,400 00	5,259 69	140 31
6. Gutter crossing and tramway stone		10,00 00	9,385 48	614 52
7. Repairing roads and unpaved streets	30,000 00			
By Ordinance Oct. 16	7,000 00			
By Transfer Dec. 17	2,650 00			
		39,650 00	39,266 15	383 85
8. Grading streets and roads	18,000 00			
To Transfer Sept. 20	4,000 00			
" " Dec. 17	1,000 00			
		13,000 00	10,497 57	2,502 43
9. Paving footways	2,500 00			
To Transfer Dec. 17	300 00			
		2,200 00	2,186 93	13 07
10. Repairing and building bridges	15,000 00			
By Ordinance Sept. 29	40,000 00			
By Transfer Dec. 17	4,000 00	59,000 00	58,992 18	7 82
Amount carried forward		223,650 00	210,967 01	12,682 99

		Amount Appropriated.	Amount Countersigned.	Balances which merge.
Amount brought forward .		223,650 00	210,967 01	12,682 99
Items.				
11. Repairing inlets and culverts . . .	20,000 00			
By Ordinance Sept. 29	15,000 00			
To Transfer Dec. 17	5,000 00			
		30,000 00	29,991 08	8 92
12. Cleaning streets .	50,000 00			
By Ordinance Oct. 16	18,934 57			
		68,934 57	68,934 57	
13. Cleaning roads and unpaved streets		8,000 00	7,875 68	124 32
14. Repairs to City Railroad	1,500 00			
By Ordinance July 7	1,500 00			
		3,000 00	2,987 78	12 22
15. Repairs to pumps and wells .		1,500 00	1,261 06	238 94
16. Intersections to branch culverts . . .	500 00			
To Transfer Dec. 17 .	500 00			
17. Printing, advertising, and stationery		1,200 00	1,200 00	
18. Insurance on bridges . .		100 00	100 00	
19. Office and yard expenses	3,500 00			
By Transfer Dec. 17	1,100 00			
		4,600 00	4,390 09	209 91
20. Incidental expenses .	1,000 00			
To Transfer Dec. 17 .	446 50			
		1,446 50	1,294 37	152 13
21. Signboards for street names . . .	200 00			
To Transfer Dec. 17 .	196 50			
		3 50	3 50	
22. Repairing streets along which the tracks of Passenger Railways are laid, &c .	1,200 00			
To Transfer Dec. 17 .	1,200 00			
23. Salaries of Supervisors . .		15,700 00	15,610 00	90 00
24. Constructing branch culverts . . .	10,000			
To Transfer Dec. 17	3,000 00			
		7,000 00	4,526 67	2,473 33
25. Railing to wire bridge . .		750 00		750 00
		365,884 57	349,101 81	16,782 76

SPECIAL APPROPRIATIONS.	Amount Appropriated.	Amount Countersigned.	Balances which merge.
Ordinance Jan. 8, 1862, for lifting ashes. . .	3,000 00	2,639 50	360 50
" Feb. 3, 1862, for Insurance on Bridges	1,200 00	1,200 00	
" March 10, 1862, for Building Culvert .	6,000 00	5,531 61	468 39
" Aug. 16, 1862, for Grading, curbing, and paving Pennsylvania avenue. .	4,930 00	3,500 00	1,430 00
	15,130 00	12,871 11	2,258 89
RECAPITULATION.			
Ordinance March 17, '62 265,450 00			
" July 7, 1862 1,500 00			
" Oct. 16, " 25,000 00			
" " 16, " 18,934 57			
" Sept. 29, " 55,000 00	365,884 57	349,101 81	16,782 76
" Jan. 8 "	3,000 00	2,639 50	360 50
" Feb. 7 "	1,200 00	1,200 00	
" March 10, 1862 . .	6,000 00	5,531 61	468 39
" Aug. 16, " . .	4,930 00	3,500 00	1,430 00
	381,014 57	362,072 92	19,041 65

Mayor's Office

SIXTH ANNUAL MESSAGE

OF

ALEXANDER HENRY,

Mayor of the City of Philadelphia,

WITH THE

ACCOMPANYING DOCUMENTS.

March 17th, 1864.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
PHILADELPHIA, *January* 1, 1864.

HON. ALEXANDER HENRY,

Mayor of Philadelphia:

SIR:—I take pleasure in complying with your request, and now lay before you a general statement of the operations of this Department for the past year.

The appropriations made to this department for the year 1863 were as follows:

General appropriation of February 21, 1863,	$19,400 00
Which has been expended as follows:	
For expenses of General Office - -	$7,650 00
Salaries District Surveyors - - -	6,000 00
New Surveys and Stones - - -	3,787 50
Revision of Old Surveys, &c. - - -	900 00
Balance unexpended - - -	1,062 50
	$19,400 00

The following is a list of Plans and Surveys that, having been examined and approved by the Board of Surveys, were referred to and confirmed by the Court.

No. 13. Revision of lines and grades on Pennsylvania avenue, from Coates to Poplar street, May 18, 1863.

No. 13. Revision of lines and grades on Canal street, from Minor street to Pennsylvania avenue, May 18, 1863.

No. 13. Revision of lines and grades on Garden street, from Broad to Twenty-third street, May 18, 1863.

No. 122. Revision of lines and grades on Pennsylvania avenue, from Poplar street to Columbia avenue, May 18, 1863.

No. 65. Revision of lines and grades of Ocean street, and vicinity of Cohocksink Creek, east of Front street, September 24, 1863.

No. 156. Second Section of the Twenty-third Ward, May 18, 1863.

No. 191. Survey and grade regulations, north-east of Holmesburg, and south-east of Frankford and Bristol Turnpike Roads, May 18, 1863.

No. 192. Survey and grade regulations between Bridesburg and Holmesburg, east of Bristol Turnpike, May 18, 1863.

No. 193. Survey and grade regulations between Pennepack and Poquessink Creeks, east of Bristol Turnpike, May 18, 1863.

Plan and Profile of Central Passenger Railway, Steam Road to Germantown, September 30, 1863.

Plan and Profile of Connecting Railroad.

As will be perceived by the amount expended, and our returns of Surveys, there has been less field work performed for the City than in former years; this is from the fact that several of the items of appropriation were so tied up by provisoes that they could not be complied with by the Surveyors; the result has been the retarding of some very important work, to the serious inconvenience of those desiring to improve, and has compelled the paving and curbing of some highways without having any established grade; but the directions of Councils by Ordinance were carried out; fortunately this has been in a section of the City where the topography is such as to allow the exercise of judgment by the District Surveyor without much risk; but it is an unsafe proceeding, and should not be repeated, as liable to entail upon the City heavy expense in alteration, when the grades may be fixed, and upon citizens who may erect buildings in conformity with the street grade as laid; their claim upon the City for damages would most probably be considered good.

The extension of our Surveys over the City Plot, it is believed, has been attended with good results, by enabling those building in the rural districts to so locate their improvements with regard to street lines and grade elevation, as to relieve the City from extravagant claims for damages, when the necessities of the City may require the streets or avenues for public highways; its importance has of late been felt in other cities of our country, and the wisdom of the policy adopted by us, commented upon in flattering terms by their officers. Since the organization of this Department, we have almost completed sectional plans of the Twentieth, Twenty-second and Twenty-fourth Wards, and as much of the Twenty-third as is now immediately required; but the First and Twenty-first should be continued, particularly the former; both have been delayed the past year by the wording of the Ordinance restricting payments, thus compelling the Sur-

veyors, should they proceed with the surveys, to expend time and money without return until the plans may be finally confirmed by Court; this forces them to seek work more immediately remunerating to gain a livelihood, at the disadvantage of the City.

The following is a list of Sewers constructed and ordered during the past year by the City, in accordance with special Ordinances.

Noble street, Third to St. John	cost	$713 00
Tenth " Market to Filbert	"	760 60
Twenty-second street, Vine to Summer	"	544 68
Twenty-third " Pine to South	"	1,403 60
Montgomery " Richmond street to Chandler School House - -	"	394 50
Green and Harvey streets, Twenty-second Ward - - - -	"	2,476 00
Seventh street, Moore to Tasker -	"	1,397 90
Davis' Landing, Swanson street to River Delaware - - - -	"	717 80
Spruce street, Twenty-fourth Ward, (unfinished) Germantown avenue, Norris to Diamond - - - -	"	1,473 25
Christian street, Twenty-third street to Schuylkill River, (unfinished) -	"	7,000 00

The following have been constructed at individual expense, authorized by the Board of Surveyors under Ordinance approved November 11, 1858.

	LOCATION.	Size.	Length.
Charlotte street,	Canal street, southward	10 in.	60 ft.
Eleventh "	Jefferson st., northward	3 ft.	100 "
Columbia avenue,	Germant'n av. to Mifflin	12 in.	
Tenth street,	Poplar st. to Girard av.	2′ 6″	
Filbert "	Tenth st., westward	2′	100 ft.
Market "	11th to Farmers' Market	3′	200 "
Second "	Columbia to Montgomery	2′	
American "	Norris to Diamond	2′	200 "
Broad "	Thompson, northward	2′ 6″	230 "
Ninth "	North of Poplar	2′	90 "
Spruce "	Twelfth st., westward	10″	45 "
" "	Thirteenth st. westward	10″	

			Size.	Length.
Lawrence	street,	Culvert st., northward	6″	80 ft.
Arch	"	Fifth st., westward	10″	150 "
Green	"	Tenth st., eastward	10″	625 "
Twelfth	"	Girard av. to Thompson		
Perth	"	Parrish st., northward	10″	
Logan	"	Vine st., southward	2′ 6″	450 "
Twelfth	"	Thompson st., northward	3′	500 "
Green	"	Sixteenth to Eighteenth	2′ 6	
Twenty-first	street,	Sansom to Walnut, and		
	on Walnut st.,	eastward - - -	2′ 6	600 "
Front	street,	Moore to McClellan, and		
	on McClellan st.,	westward - - -	6″	
Garden	street	Willow to Buttonwood	2′	
Fourth	"	Moore to Tasker	2 6″	850 "
Buttonwood	"	Sixteenth to Seventeenth	2 6″	400 "
Fourth	"	Race st., northward	10″	200 "
Mulvaney	"	Montgomery st., southward	2	260 "
Cuyler	"	Twentieth st., eastward	12″	100 "
McIlwain	"	Fifth to Sixth	8″	

Upon the subject of Sewers, it will be necessary for me, to some extent, to recapitulate a portion of my former report, as but little has been done during the past year in the construction of *mains*.

In the upper section of the City, it is highly important that the open channel of the Cohocksink, east of Tenth and Norris street be covered in, and that the auxiliary sewer, projected in the Report of 1856, be constructed on the line of Norris street, &c., emptying into the Delaware River at Palmer street; its cost will approximate $200,000 at present prices. In the lower section, the Sewer on Federal street, with its upper branches, should, in part, be constructed at an early day; this empties into the Schuylkill at Ellsworth street, immediately below the Arsenal, and extends eastward to Eighteenth street; the cost of this, approximately will be $75,000. This section, for the most part, now drains into the clay-pits which have been worked out, the water lying there until evaporated or absorbed—neither of which occur until stagnation has taken place, and its malarious influence has had its effect upon those residing upon and near the locality; in the same section, the necessity for some provision being made for the drainage which now passes off by the

Chickhausing Creek, increases every year. This stream originally took its head near Fifteenth and Pine streets, and passing down Thirteenth street to near Wharton; thence eastwardly through the Parade Ground to Twelfth and Reed streets, and on southward, crossing Broad street near Moore street, Passyunk Road near Sixteenth street and Moyamensing Road, east of Penrose Ferry Road, emptied into Hollander's Creek. The Sewers on Pine, Thirteenth, and Christian streets of early construction, and on Federal, Wharton and Reed streets of later years, cut off the drainage north of the Prison and east of Broad street; but there is yet much area now covered with buildings, and some of it with residences of costly construction that have no means of drainage except by using our street gutters; and much inquiry has been made as to when they may expect relief. This Sewer, as has been previously stated, cannot be properly constructed in part, until the general system has been developed by extended instrumental examinations. The cost of this work entire will be great, as most probably a tidal drain will be found necessary, so arranged if practicable, that from the difference in tide elevation, a current through it may be obtained; its capacity must be large, so that storage room may be had to provide for the drainage between tides; this investigation should be ordered at an early day.

The basins at Beaver and St. John streets, and Third and Culvert streets, should be cared for; the first by constructing a four-feet sewer from Canal street to Germantown road, on Beaver, Second, and Otter streets; this would, while relieving the basin, give greater outlet area to the Canal street sewer. The second may be relieved by constructing a three-feet sewer on Beaver street, westward to Third street, with such inlets as will intercept the flow from Brown street. The heavy gradients on both sides of Culvert street brings the storm-water to the basin with such rapid accumulation as to render an increased inlet capacity imperative. And still another might be made, of three feet diameter, on Globe street, from Canal street to Germantown road, as a relief to Canal street in extraordinary storms. The value of these sewers for private drainage along their several lines is as great as their usefulness for relief to the mains.

Many minor sewers are necessary, and every encouragement should be given for their construction as asked for,

whether at public, or, as is often applied for, at individual, cost, for each line built, takes from the street surface by increasing the number of inlets, what tends to effect injuriously the healthfulness of the City.

Greater attention should be given to the inlets, not only to prevent their being offensive to the locality, but to allow them to perform their full duty. The greater portion of them are so constructed, with a water-trap, that if permitted to fill up with street detritus, as is most common, their delivery into the sewer is entirely stopped, and every inch depth of material washed in their sumph from the street reduces their capacity. In many cases the want of the full action of the inlets—the result of neglect in cleaning—has caused floodings, which have been attributed to want of capacity in the sewers. This mode of constructing inlets is the most approved, as preventing the effluvia from the sewer polluting the atmosphere we breathe; to gain this most desirable end, such arrangements should be made that every trapped inlet in the City should be cleaned out once a week, and some, in localities such as around markets and market streets, more frequently. The condition of our sewers should be examined with reference to the amount of deposit lying in them, reducing their capacity. That on Pennsylvania avenue, near Girard avenue, is nearly filled with material washed in during the heavy storm of last year, and should be cleaned out; in the Canal street sewer, also, there is much deposit, and no doubt there are others equally bad. In European cities the work of cleaning out deposit is continually going on.

In previous reports the importance of having all connections to our sewers made from residences constructed properly, both as regards workmanship and position, has been dwelt upon, but as yet no action has been taken. In London all work immediately connected with the City sewers is performed by persons in the employ of the City who are familiar with such work, and in accordance with directions issued from the Engineer of the Metropolitan Board, thus preventing injury to the sewers by being broken into at any point by any one whose interest alone is to perform the work perhaps in the shortest time and at the least expense. This should be corrected; and as regards the granting of permits for making such connections, they should be issued at this Department, so that a proper record of the position may be made. This

Department alone has a record of the location of sewers, and is therefore better advised of what may be necessary, and better able to judge as to the propriety of granting the permit asked for. Certain guards should also be thrown around this privilege, and only such matter be allowed to pass into the sewers as may be carried off without precipitation; no privy well should be drained into a sewer, while the introduction of water-closets should be by law insisted upon for every house within one hundred feet of a sewer, and, when practicable, the cesspools should be destroyed; if retained, they will, by the permeation of the fæces into the surrounding soil, so infect it, as to generate disease and encourage epidemics in our midst.

Again it becomes necessary to call your attention to the condition of our City bridges, and urge the great importance of closer watchfulness and care; watchmen are appointed to each bridge, but what their duties are has never been set forth; much of their leisure could be advantageously occupied in preventing the great accumulation of dust not only upon the road-way, but upon the frame timbers, which accumulation is most injurious as generating decay. The Falls Bridge is in good order. The Girard avenue Bridge stands well since the repairs and strengthening additions made in 1858, but the road-way is neglected, and should have a new course of oak planking upon it. I beg leave to call attention to the condition of the road-way at both ends of this bridge, which is seriously obstructed by the position of the diverging tracks of the Passenger Railway, rendering it dangerous to all vehicles approaching the bridge from either direction; they could be altered at small cost, and the interest of the City demands it. The Wire Bridge itself is thought to be in good order, but its cables and suspenders should be painted; the new truss railing recommended in last report, has been added; this bridge with its open-laid cables, can never be entirely confided in, owing to the impossibility of ascertaining what changes are in progress in the interior of the cables; so long as protected from the action of the weather, there is no reason to suppose that deterioration has taken place, but in this the only protection is by paint, the value of the application of which is not justly appreciated. Absolute security would call for new cables, which can now by the improvements of machinery, be so over-laid as to effectually

prevent the penetration of moisture. The western approach to this bridge is still in a most deplorable condition, and should for the credit of our City, be put in proper order; the road-way is insecure, the anchor pits of the cables are neglected, and the whole locality unworthy an entrance to a great City; the work requisite, will cost now from $15,000 to $20,000. The Market street Bridge, one of the greatest thoroughfares of our City, and one which should have the most jealous care, has during the past year been most sadly neglected; early in the summer, a portion of the roof was destroyed by a hurricane, and earnest endeavors were made to secure its repair, but they were ineffectual until the summer and autumn's rains had done their damage to its framing, and the cold of winter came, preventing a proper attention to and in its repair. Again, let me say it should be protected by weather-boarding, and its southern floor examined and placed in good and safe condition; if this bridge does not receive better care, and its lower chords and brace footings (particularly of the center truss,) cleaned from the continued accumulation of mud and dirt, the City will at no late date be called upon for a new structure, when half the real life of the bridge has not elapsed; the bridge is a noble structure, and worthy of all care. The Penrose Ferry Bridge, which has lately become the property of the City, must have attention during the coming year; as previously reported, it should be adjusted to shape and strengthened in its braces and chords; an application has been made by the Tow-Boat Company, asking for the construction of guards at the pivot and north draw pier; this was upon the original design for the bridge, and would facilitate the passage through the draw, and thus protect both boats and bridge, and by building a rest upon these guards for the draw when open, would reduce the cost of repairs. I would recommend the erection of the guards as asked for; the cost at the present range of prices for material and labor, would be about $10,000. There are several small bridges that should be renewed or repaired. The Bridge over Pennsylvania avenue, on Girard avenue, has suffered much from neglect; no attention has been given to the surface-drainage upon its approaches, which has injured the western arch, though I trust not seriously; it should be relieved of its stone floor, and with its approaches paved with cobble stone for the present, and have

the wing walls extended so that the surface-water could be carried over and beyond it; the railing has been in a dilapidated condition for a long time; it might be a marked feature connected with the Park, as it will be a principal entrance. Several of the bridges over Gunner's Run need immediate adjustment, painting and future care and attention, and such strengthening additions as has lately been made at York street, which is now as firm as its general proportions will allow. The Bridge over the Cohocksink on Delaware avenue, which was a wooden queen post bridge, and erected in 1856, was lifted from its seat in September last, by a canal boat getting fast under it, on the rise of tide; it was demolished, and it may be considered providential, for an examination had been made of it a few days previous, and it was pronounced unsafe; the lower timbers had been cut away by evil-disposed boatmen, rendering it entirely insecure as a public highway; plans were at once prepared for the erection of a new bridge, with iron plate girders for its support, but no authority for its erection has yet been granted; on such a highway, there should be a bridge of the most permanent character, having stone abutments; but such cannot be recommended at this time, owing to the great cost; it is therefore proposed to use the same timber abutments, and raise its road-way so as to afford better accommodation to the passing canal boats; the cost of this structure will be about $5,000.

I beg leave to allude to the mode in which these works should be performed, and make the assertion that no work that can be explained in a specification, should be performed other than by contract, having a proper officer connected with this Department, whose duty it shall be to have the immediate supervision of such work. Much difficulty, and, I fear, ill feeling has been caused during the past year, from the fact that this Department was called upon to endorse bills for repairs to bridges as correct, which could not be sanctioned; the excess of cost having been occasioned by having the work performed by day's labor. All persons experienced in such matters, know that laborers will not work for a corporation as for an individual, and particularly in the case of municipal work, the superintendent has not that control of his men that a contractor has. The Department, though desiring to be liberal, has not been able to swell the correct value to the cost presented, and thus, in some instances it is believed good

men have unavoidably been the sufferers; had this work been done by contract, we would have had work of equal quality, at much reduced cost, and performed most probably by mechanics skilled in such work. Supposing, a proper superintending officer in immediate charge, and, if the work projected should be performed as now suggested, the estimates made will, it is believed, cover the expenditure, otherwise they will not reach; no contract should be alloted to persons whose business experience would give no knowledge of the work to be performed.

It is a matter of great regret, that circumstances beyond control, have prevented the opening of the Chestnut Street bridge for travel on the first of January, 1864, as was anticipated; the causes are known to all, and therefore, it is unnecessary to amplify; but will state that having been forced to go to the eastward for our face stone, the delay of its shipment caused by the appropriation of so many vessels for Government service, has regulated to a great extent, the progress of the work. The scarcity of labor is the other great difficulty, retarding the supply of our home stone; the contractors, it must be acknowledged, have exercised so far as it is possible to judge, all energy in endeavoring to procure supplies; and, although their losses were heavy, having made their estimate of value on peace prices; yet, no illusion was made to giving up the work, and every order was as promptly obeyed as could be reasonably required; and, it is to be hoped that the late advance of price granted by Councils, will relieve them from the difficulties financially, under which they labored. The condition of the work now is such as to give us hope that it may be opened for use during the coming fall. The two main abutments are at spring line, the main pier but three feet below spring, or, sixteen feet above low water; the eastern approach is ready for the arches, with the retaining walls to roadway level, while the Twenty-fourth street archway has its abutments to spring, and piers above ground. On the western side, the approach archway abutment and pier is above ground, and the retaining wall far advanced. As the work progresses to completion, it will be necessary to arrange the level of, and pave Bridgewater street, between Market and Chestnut, and Chestnut street, west of Bridgewater, and the early attention of Councils to this is desired.

The iron work is progressing, and will, without doubt, be ready for erection so soon as the masonry is prepared. These contractors have alluded to the necessity of calling upon Councils for assistance.

I must again refer to the great necessity of having proper plans prepared of parts of the built-up portions of our City; there are none on file showing the established lines of the "Old City," Northern Liberties; and below South street to the line of Passyunk our plans are very imperfect, giving neither reliable distances nor elevations. For Passyunk we have not yet been able to obtain the plans prepared under the Commissioners of Survey, for which a large amount has been expended by the City; all those plans should be perfected and placed on file.

During the past year much valuable information has been placed on file relative to the history of many of our streets, roads, and lanes. The result of the tedious examination of of old and musty books, so far as it has progressed, is now of easy access and reference, and will throw light upon many localities, the early names of which are now forgotten, and unless traced up and indexed by the nomenclature of later years, as is now being done, might be said to be, in fact, lost, as many of these old lanes have become obliterated by the opening of streets, but a knowledge of their position is of great value in establishing lines and preparing briefs of title. By Ordinance of Councils the duties of the clerk preparing these records terminate January 1, 1864, and it is very desirable that the work should be perfected; I trust, therefore, it may not be curtailed in the unfinished condition it now lies.

I cannot, sir, close this report without referring to the prompt action of the Board of Surveys during the trying times of the past summer, when, upon the first threatenings of invasion by the army of traitors, they offered the use not only of all their valuable private information, but their entire time and services, to the officers of the General Government who were detailed to prepare for our defence. Their valuable aid has been acknowledged, and no doubt much time and expense saved by their timely assistance.

Respectfully submitted.

STRICKLAND KNEASS,
Chief Engineer and Surveyor.

SEVENTH ANNUAL MESSAGE

OF

ALEXANDER HENRY,

Mayor of the City of Philadelphia,

WITH THE

ACCOMPANYING DOCUMENTS.

APRIL 6th, 1865.

DEPARTMENT OF SURVEYS.

DEPARTMENT OF SURVEYS,
December 31, 1864.

HON. ALEXANDER HENRY,
Mayor of Philadelphia.

SIR: I take pleasure in submiting the usual annual report as to the condition of this Department, with an exhibit of the expenditures for the past year.

The appropriations for the year 1864 have been as follows:

General appropriation, approved Jan. 26, 1864,	$22,520 00
Special " " Nov. 12, 1864, for survey of Delaware front for wharf line,	3,000 00
	$25,520 00

Which has been expended as follows:

Expenses of General Office, - - - -			$9,659 00
Salaries of District Surveyors, - - -			6,000 00
New surveys and landmarks, - - - -			4,663 50
Revision of old surveys, - - - - -			1,051 00
Balance unexpended to merge,	$1,146 50		
" " carried over,	3,000 00		
			4,146 50
			$25,520 00

The District Surveyors have during the past year filed the following plans among the Records of this Department:

No.	Title	Approved by Board.	Confirmed by Court.
194.	Adjustment of grades, 1st Sec., Nineteenth Ward.		
195.	" " 2d " " "		
196.	" " 3d " " "		
197.	" " 4th " " "	1864,	
198.	Lines and grades, 4th " Germantown,	June 6.	1864.
199.	" " " First Ward,	April 4.	Oct. 22.
200.	" " 7th " "	Jan. 25.	Mar. 22.
201.	" " 4th " "	Aug. 23.	Oct. 22.
202.	" " 4th " Twenty-sixth Ward,	Jan. 25.	Mar. 22.
203.	" " 5th " " "	Dec. 5.	
204.	" " 9th " Germantown,	June 6.	
185.	" " 3d " "	"	
99.	" " part of Twenty-sixth Ward,	June 20.	
205.	" " 4th Sec., Bristol Town'p,	"	
8.	Revision of grades on Dock street,	July 1.	
46.	" lines Baltimore avenue,	Sep. 19.	
42.	" " Thirty-first street,	Sep. 5.	Oct. 22.

The work for new surveys, or the extension of the City plans beyond the built limits has been continued with energy during the last year, but confined for the most part to the First, Second, and Ninth Districts, where the progress of improvements has required that lines and grades should be established for the benefit of individuals, by enabling them to erect buildings without fear of injury by a change of elevation; and of the City, by obviating future costs for damages should the lines extended encroach upon improved property.

Since the presentation of the last annual report there has been a change in the system of building sewers. The Act of Assembly approved April 8, 1864, annulled the Act repealing the authority under which the City charged the properties

fronting on sewers a portion of the cost of their construction, since which time there have been a number of sewers constructed taking advantage of the law, thus distributing the expense, where frequently a few were from the force of circumstances required to bear the burden. The following is a list of sewers built, which, under a settled condition of financial affairs, would have yielded a revenue, but have now cost the

City, - - - - - - - - -	$23,164 99
And individuals, - - - - - - -	6,828 96
Total cost, - - - - - -	$29,993 95

LOCATION.			Size.	Length.	Cost.
Eighteenth street,		Wallace to Coates,	2′ 6″	447	$1,069 60
Christian	"	Twenty-third st. to R. Schuylkill,	4′	2,667¼	7,796 64
Spruce, Locust, and Forty-first streets,			4′	1,060	
			3′ 6″	772½	4,005 55
Wallace street,		west from Andress street,	2′	263′	888 60
Market	"	at Twelfth,	3′	868½	1,493 34
Wallace	"	Eighteenth to Nineteenth,	2′ 6″	411	783 58
Twelfth	"	Girard avenue to Thompson,	2′ 6″	596	1,835 04
"	"	Thompson to Jefferson,	3′	980	2,420 60
"	"	Jefferson to Oxford,	2′ 6″	525	1,896 00
Brown	"	Ridge avenue to Seventeenth,	3′	916	2,575 40
Memphis	"	Norris street northward,	2′ 6″	498½	1,619 75
Vienna	"	Belgrade to Memphis,	3′	929½	3,117 50
Broad	"	at Master, Jefferson, and Oxford sts.,	2′ 6″	150	315 00

The following is a list of sewers authorized, some of which are in progress of construction:

Twenty-fifth street,	Green st. to Pennsylvania ave.,		10″
Green "	Twenty-second to Twenty-fourth,	3′	
Frankford road,	Allen to Wildey,	3′	
Twenty-second st.,	Wood to Callowhill,	3′	
Callowhill street,	Twenty-first to Twenty-second,	2′	6″
Tenth "	Girard avenue to Poplar,	2′	6″
Bridge "	Penn'a R. R. to River Schuylkill,	3′	
Wallace "	Ridge avenue to Broad street,	3′	

And the following is a list of those authorized by the Board of Surveyors to be constructed at individual expense:

Front	street,	Girard avenue to Thompson st.,	3′	
Hamilton	"	Thirteenth to Broad,	2′	6″
Walnut	"	Twentieth to Twenty-first,	2′	6″
Lombard	"	Fifth to Sixth,	3′	

Hurst	street,	Lombard to South,	2′	6″
Ninth	"	Vine southward,		10″
Barnwell	"	Pine to Lombard,	2′	6″
Spruce	"	Front to Little Dock,	3′	
Front	"	Spruce to Dock,	3′	
Cherry	"	Fifteenth to Kershaw,	2′	6″
Kershaw	"	Cherry to Race,	2′	6″
Montgomery	"	Twenty-third to Woodstock,	3′	
Woodstock	"	Montgomery northward,	3′	
Pearl	"	Twentieth to Twenty-first,	2′	6″
Twenty-first	"	Pearl to Vine,	2′	6″
Marshall	"	York to Dauphin,	2′	6″
Dauphin	"	Marshall to Sixth,	2′	6″
Sixth	"	Dauphin to Diamond,	3′	
Medical	"	Tenth street westward,		10″
Broad	"	Walnut to Chestnut,	2′	6″
Palethorp	"	Norris street northward,		8″
Eleventh	"	Nectarine northward,		8″
Amber	"	Cumberland to Sergeant,	3′	
Bond	"	Ninth westward,		12″
Thompson	"	Mascher eastward,		12″
Chestnut	"	east from Fifth,		12″
Fourth	"	Walnut street to Willing's alley,	2′	
Jones	"	Fifteenth to Sixteenth,	2′	6″
Twelfth	"	Arch to Filbert,	2′	6″
Front and Coral to Otis,			3′	
Broad	street,	north of Thompson to Oxford,	2′	6″
Brown	"	Fourth to Third,		12″
Whitehall	"	west of Thirteenth,	2′	6″
Race	"	" Eleventh,		10″
Tasker	"	" Seventh,		10″
Barclay	"	east of Seventh,		12″
Market,	"	west of Sixteenth,	2′	6″
Berks	"	Second to west of American,	3′	0″
Oxford	"	Fifth to Mifflin,		8″
Washington	ave.,	Fourth street westward,		12″
Chestnut	street,	Hudson's alley and Fourth st.,		12″
Sixteenth	"	Thompson to Master,	3′	
Seventh	"	Reed to Wharton, and on Wharton east,	2′	6″
Hanover	"	Richmond st., to River Delaware,	3′	

By the act alluded to we are yet to a certain extent trammeled; for the judgment of the Board of Surveyors cannot be exercised as to the necessity of a sewer for the interest of the City, unless it be a main. The requirements of the Act are that no *branch sewer* shall be built and have its proportion of cost paid for by the residents on its line, unless a majority of the owners fronting upon it may consent or request it to be done. This delays the building of many important branch sewers which are needful for surface drainage, but lie in front of that class of property which the owners will not think requires underground sewer connections. Owing to the high price of materials and labor, it has been necessary for Councils to appropriate for the construction of many of these branch sewers, as the $1 50 per foot linear charged under the act to the property adjoining has not during the past year covered more than 60 per cent. of the cost. In some instances the parties interested have, on account of Councils declining an extra appropriation, been forced to undertake the construction themselves, by contracting for the work at the limit allowed by law, after going through the usual form of advertising, and thus bearing the extra cost themselves. This arrangement enables them to take advantage of the law, and assess the property its entire length.

Nothing has been done during the past year in the construction of the main sewers noted in the report of 1863, the necessity of which is now greater than then. I allude to the Cohocksink, from Front street to the river, and its auxilliary on Norris street; Federal street emptying into the Schuylkill, and the sewer for the drainage of the southern section of the City, below the prison, with several branches, all of which are minutely described in my last report.

The Pennsylvania avenue and Cohocksink sewers have not been cleaned, as has been repeatedly recommended, and fears may well be entertained, that unless the mud is cleaned out of the Cohocksink and Canal street sewers, which now fills half its area, the result will be a repetition of the floodings so much complained of. This should be done during the winter, and a channel-way cleared out down the creek to low water. The importance of this cleansing I cannot impress too strongly upon Councils.

By building the upper end of this sewer, from Berks to Norris street, on Ninth, a large and valuable area will be opened for

improvement; the increased assessment upon which will more than pay the interest on the cost of the work. This matter has been before Councils, having been examined and reported favorably upon, both by the Board of Surveys and the Committee on Surveys and Regulations.

The sewers across Thompson street, and under the Reading Railroad, near the Spring Garden Water Works, are yet unimproved, and unless these sewers are enlarged, as has been suggested, the grading and paving of the streets within the water shed of stream emptying at the point will throw the drainage so much more rapidly into them that much injury to property may result.

Among the sewers that will be called for at an early day, is that proposed for Broad street, northward from Allegheny avenue, which should be constructed before the improvement of Broad street, which is now so much desired, is commenced. This sewer is upon the head waters of Gunner's Run, and must be about eight feet diameter, and, at present prices, will cost about $18,000.

There has been no change in the law regulating sewer connections from private property, and the same evils so frequently alluded to in previous reports still exist. A bill was presented to Councils, during the past year, which it was thought would correct them; but owing to the objections made to some of its features, by the Board of Health, it was withdrawn; and as it has opened up a most important question in city hygiene, it will be a subject for a future report; the want of time to make proper investigations alone preventing its presentation before this.

The Bridges over the Schuylkill are in much better condition than at the date of last report, except the Girard avenue, which has had but little attention during the year, and needs a new roadway and painting.

Market Street Bridge has had extensive and important repairs; the southern roadway has been strengthened by the introduction of a larger number of floor beams, with an improved system of lateral bracing, and the plan of laying the railroad track and flooring has been so changed that any repairs can now be performed without interference with travel—the track being entirely independent of the flooring. The use of the new floor beams was not only to strengthen the roadway and render the bridge more stable, but to allow

a widening of the southern footway, which has proved to be most acceptable to the public. This bridge yet requires painting, and a new roof upon the eastern half. The old roof was patched and repaired during 1863, but now should be renewed; but owing to the high price of metallic roofing, it would be better to adopt, as a temporary matter, a cheaper plan, which may be done at but little cost, over and above the value of the old material.

The Penrose Ferry Bridge has for several months during the past year been out of use, owing to the breaking of the main bolster of the draw, and afterwards by the settling of the main permanent span, to such an extent as to call for the interposition of this Department, and require that the bridge be closed to public travel; since that time a new span has been erected, and the draw placed in such working order as to be easily thrown off and on by a single watchman. The old permanent span was light in all its proportions, and had settled upon its arches, which were slowly but surely throwing over the piers; and had not the trusses been injured by a vessel, thus compelling the erection of a new span, most probably the expense of repairs would have been double. The new span is a Howe truss of large proportions, without an arch, as the masonry is not suited for arches. During the coming year the trusses will require adjusting, as the timber seasons, and should be attended to by one familiar with the operation, and then be whitewashed or painted. The guards at the pivot and north draw pier, as asked for by the Tow Boat Company, and which by an agreement with the Schuylkill Navigation Company, the City is called upon to build, have not been erected, and the recommendation of last year is repeated, as a protection to the bridge.

The Wire Bridge itself has not required attention during the year, but it should be painted at the earliest day. The approach from the west is now being placed in good condition, by the erection of side retaining walls, which will allow the street to be raised to grade level of full width and have protecting cells made for the west shore ends of cables. The cost of this work will probably exceed the appropriation made, owing to the difference in the character of foundation from that anticipated, and the consequent increase in size of walls.

The Bridge over the Cohocksink, on Delaware avenue,

which was destroyed in 1863, has been replaced by an Iron Pratt Bridge, and is a substantial structure.

The masonry of the Chestnut Street Bridge is very near completion, and has been ready for the iron superstructure since June last; the only work to do is turning the arches in the western approach, and adding a few feet of elevation to the retaining walls; all of which can be completed in about two months after the opening of spring.

The iron work has been delayed by the necessity of building proper machinery for fitting, which is now in successful operation. The erection will commence as soon as the river is free from ice, and we are enabled to build the necessary frame work upon which the iron work can be placed in position. The contractors, Messrs. Willcox & Whiting, have transferred their interest in the bridge to the "National Iron Armor and Ship Building Company;" and in reply to a note referring to the necessity of its completion, I am advised that they will commence operations at the bridge site on or about the 10th of March; but they have not yet answered my queries as to the probable time of completion, and I have been met by so many disappointments in the prosecution of this work, owing to the peculiarity of the times which commenced with its beginning, that I withhold expressing any opinion as to when it will be open to public use; but I must add that the delays are not peculiar to this structure, as all works of magnitude, now in progress, are retarded by the same causes.

The appropriations made for the bridge, and the expenditures to December 1, 1864, are as follows:

Total appropriation, - - -		$317,000 00
Estimates paid, Masonry,	$247,178 51	
Iron Work,	48,210 00	
Salary,	4,522 50	
Incidentals,	939 58	
		$300,850 59
Balance of Loan, - - - -		$16,149 41

There is about $28,500 worth of work yet to do upon the approaches, and exclusive of advances made upon the contract prices, rendered necessary by the rise in labor and ma-

terials, the total cost of structure will be several thousand dollars less than the estimate presented to Councils at the allotment of the work.

The surveys for establishing a wharf line north of Bridesburg and south of the Point House, are now in progress, and will be advanced by spring, should the ice in the river allow the necessary soundings to be taken from its surface.

The demands for a new bridge at South street, on the Schuylkill, have been so urgent, as to call for plans and estimates therefor by Councils; these are now being prepared; but it has been necessary to wait for the plan of the proposed arrangement of streets upon the Alms-house property before a location for the bridge can be determined upon, and the necessary soundings taken.

This structure will be costly from the fact of the necessity of crossing three lines of railroads overhead, thus giving a safe thoroughfare.

The bridge itself, unless otherwise ordered, must be designed as a draw-bridge; but I earnestly trust that so great an obstacle to the public convenience will not be insisted upon for the benefit of the very few.

The approaches will be very costly, from the great length upon each side of the river, that it is imperative to bridge or wall, to avoid the railroads on the west, and obtain a good gradient on the east.

I would call your attention to the importance of having proper surveys and plans made of the property owned by the City, which plans should be bound in atlas form, and deposited among the City archives in this office; it is very certain that there is much property belonging to the City the ownership of which is not known, and much although known where the lines are not properly recorded.

There are some very old plans of wharf property within the Old City, which are in atlas form, but so many alterations and changes have taken place since their preparation, that although valuable for the boundary lines, their position can hardly be recognized. The expenditure for such work, I believe, would soon be repaid in rents now uncollected.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF PUBLIC HIGHWAYS.

OFFICE OF THE CHIEF COMMISSIONER,
S. W. corner of Fifth and Walnut Sts.
PHILADELPHIA, January 13th, 1865.

HON. ALEXANDER HENRY,
Mayor of Philadelphia.

DEAR SIR:—In complying with your request, I take pleasure in laying before you a general statement of the operations of this Department for the past year. The receipts have been, as per Statement A, hereto annexed, $24,503 88, being $1,940 07 increase over the receipts for the year 1863.

The license due from the West Philadelphia Passenger Railroad Company, amounting to about $1,000, has not been paid as in former years; the question of its liability to the City being in litigation.

The amount of general appropriation by Ordinances of February 20th and November 21st, 1864, was $357,625 00, of which $320,257 13 has been expended, leaving a balance of $37,357 87 that merged as per Statement B.

The amount of special appropriation during the year, together with the unexpended balances of special appropriations, brought forward from 1863, make $119,931 02. The amount expended during the year was $93,564 62; of which $56,635 37 was paid for deficiencies of 1863, and work contracted for in that year, and partly completed; so that the actual expenditure of special appropriations for the year is $36,929 25, making the total amount of expenditure during the year, $357,186 38, exclusive of $85,257 12 disbursed for the construction of the Chestnut Street Bridge, which is exclusively under the direction of the Chief Engineer and Surveyor, as per Statement C.

Market Street Bridge has been thoroughly repaired by replacing the entire southern roadway and widening the southern footway, and by a general adjustment of the entire

superstructure, at an expense of $19,199 20, $3, 404 39 of which was paid by the West Philadelphia Passenger Railway Company. This bridge is now in good condition, and will need no further expense, excepting for painting and probably slight repairs to the roof.

Penrose Ferry Bridge has been put in good condition by a new permanent span in place of the old one removed, and general repair of the draw, at a cost of $16,325 56. It is now a substantial structure, and will require no further expense for several years, excepting at the approaches.

A number of the smaller bridges have been repaired, but owing to the high prices of labor and material, others that should have been repaired have been left for attention during the present year. The most important of these are the Girard Avenue Bridge, over the Schuylkill river, which will require new roadways; the Girard Avenue Bridge, over Pennsylvania avenue, and the Bridge on Girard avenue, over the Aramingo canal, both of which need early repairs.

The present system of paving streets is objectionable. The authority given by Councils to pave streets directs this Department to contract with the paver having the highest number of signatures on the line of the street to be paved, which, in many cases, are secured by promises to do the work at very low prices. A contract once made, the contractor selects his own time for doing the work, and, in fact, his own mode to secure the largest profit from it; involving the City, in many cases, in large expense for intersections and crossing stone on the streets or portions of streets not required to be paved.

If Councils would pass a general Ordinance, authorizing the Chief Commissioner to contract for streets or portions of streets, (authorized to be paved,) as the wants of the City might seem to require from time to time, to be paid for by assessment bills against the property fronting on the street, I think the work would be more substantially done, and the Department could control the appropriation for intersections and for crossing stone.

The numerous breaks in culverts and inlets requiring immediate attention of the Department, at a season of the year when the Department is out of means to make the necessary repairs to save the City from loss or damage, cause serious annoyance to the Department, in consequence of

Councils not making the appropriation in proper time to enable the Department to perform the duty devolving upon it.

The Passenger Railway Companies having taken charge of many of our principal streets, as they occupy the middle thereof, and have the right of way, necessarily divert all other travel on either side, and their gutters having been paved with brick are fast wearing out; and I am of opinion that those Companies having bound themselves to keep the street in good repair from curb to curb, should, in repairing them, pave the gutters with good substantial stone.

Very respectfully,

W. W. SMEDLEY,

Chief Commissioner of Highways.

STATEMENT A.

Receipts of the Department of Highways for the year 1864.

From January 1st to February 20th, 1864,	$9,280 40
" February 20th to December 31st, 1864, viz:	
For Sewer Permits,	1,590 00
" Permits for Repaving,	593 00
" Sewer Rents,	5,258 73
" Dray, Cart, Wagon and Barrow Permits,	1,298 25
" Building Permits,	306 00
" Vault Permits,	283 08
" Hotel, Private and Hackney Coaches and Drivers' Licenses,	761 00
" Miscellaneous Receipts,	2,453 92
" Passenger Railway Car Licenses,	2,634 50
" Omnibus Licenses,	15 00
" Railroad Turn-outs,	30 00
	$24,503 88

STATEMENT B.

Appropriations to the Department of Highways for 1864.

Item.		Amount Appropriated.	Expended.	Merging.
1	Salaries of Officers	$17,150 00	$16,196 33	$953 67
2	Paving Intersections	15,000 00	10,150 17	4,849 83
3	Repairing Streets	78,000 00	77,997 84	2 16
4	Repaving Streets	8,500 00	5,780 00	2,719 50
5	Repaving Streets over Water Pipe	6,500 00	5,494 82	1,005 18
6	Gutter, Crossing and Tramway Stone	17,000 00	16,952 20	47 80
7	Repairing Roads and Unpaved Streets	60,000 00	59,996 05	3 95
8	Grading Streets and Roads	17,000 00	11,396 26	5,603 74
9	Repairing and Building Bridges	27,000 00	26,862 10	137 90
10	Repairing Culverts and Inlets	40,000 00	40,000 00	
11	For Improving the Approaches at the west end of the Wire Bridge	16,000 00	4,435 08	11,564 92
12	Repairing City Railroad	3,000 00	2,875 98	124 02
13	Repairing Pumps and Wells	1,200 00	1,161 00	39 00
14	Opening Streets	200 00	114 50	85 50
15	Printing, Advertising and Stationery	2,700 00	2,700 00	
16	Insurance on Bridges	1,600 00	1,500 00	100 00
17	For Rent of Offices, Yard Expenses, and the Payment of Five Watchmen	4,000 00	3,944 53	55 47
18	Incidental Expenses	1,800 00	1,800 00	
19	Sign Boards for Street Names	200 00	199 80	20
20	Repaving and Repairing Railroad Streets	3,200 00	1,552 88	1,647 67
21	Salaries of Supervisors	19,575 00	19,525 00	50 00
22	Construction of Branch Culverts	15,000 00	9,622 64	5,377 36
23	Paving and Repairing Footways	2,000 00		2,000 00
24	Repairing Delaware River Banks	1,000 00		1,000 00
	Total of General Appropriation	$357,625 00	$320,257 13	$37,367 87

STATEMENT C.

Special Appropriations.

	Amount Appropriated.	Expended.	Balance.
Total of Special Appropriations made during the year 1864.....	$93,219 92	$77,283 71	$15,936 21
Total of Special Appropriations made during the year 1863, and whose balances have been brought forward,.....	26,711 10	16,280 91	10,430 19
Grand Total of Special Appropriations.....	$119,931 02	$93,564 62	$26,366 40
Chestnut Street Bridge Loan, balance brought forward.....	$103,923 23	$85,257 12	$18,666 11

DEPARTMENT OF STREET CLEANSING.

PHILADELPHIA, January, 1865.

HON. ALEXANDER HENRY,
Mayor of Philadelphia.

SIR:—I have the honor to present the following statement of the affairs and condition of this Department from its organization on the 1st of March 1864, to the 31st day of December last.

The several items of appropriation made to this Department for the year 1864, were as follows, to wit:

Item 1. For salaries of Chief Inspector and Clerk, - - - - -	$2,500 00
Expended, - - - - -	2,083 33
Balance, - - - - -	$416 67

Item 2. For rent of office and purchase of furniture,	$1,050 00
Expended,	1,023 59
Balance,	$26 41
Item 3. For light and fuel for office,	$100 00
Expended,	50 00
Balance,	$50 00
Item 4. For stationary, books, printing and incidentals,	$1,300 00
Expended,	1,260 60
Balance,	$39 40
Item 5. For purchase and repair of tools &c.,	$2,250 00
Expended,	1,783 66
Balance,	$466 34
Item 6. For rental of wharves, and dumping ground,	$1,800 00
Expended,	757 56
Balance,	$1,042 44
Item 7. For pay of laborers for cleaning streets,	$33,900 00
Expended	33,631 61
Balance,	$268 39
Item 8. For hire of horses, carts and drivers,	$75,100 00
Expended,	74,270 75
Balance,	$829 25
Total appropriation,	$118,000 00
Expended,	114,861 10
Balance,	$3,138 90

The appropriation of February 15, 1864, was,	$100,000 00
" " " October 31, " "	18,000 00
	$118,000 00

The above items of appropriation are not in amount as originally passed by Councils, but in accordance with the transfers made during the year to equalize said appropriations.

Amount received and paid to the City Treasurer.

For street dirt, - - -	$7,280 88
For ashes, - - - -	2,818 92
Total, - -	$10,099 80

Which, deducting the above receipts from the amount paid out, makes the entire cost of cleaning the streets and removing the ashes, from the 1st day of March to the 31st day of December 1864, including expenses of organizing the Department, - - - - - - - $104,761 30

Number of loads of dirt and ashes removed from the 1st day of March to the 31st day of December, 1864.

	Loads of dirt.	Loads of ashes.	Total loads.
First District, First, Second and Twenty-sixth Wards:	12,249	4,698	16,947
Second District, Third and Fourth Wards:	7,543	5,892	13,435
Third District, Fifth Ward:	4,840	3,279	8,119
Fourth District, Sixth Ward:	3,089	6,591	9,680
Fifth District, Seventh and Eighth Wards:	7,170	7,775	14,945
Amounts carried forward,	34,891	28,235	63,126.

	Loads of dirt.	Loads of ashes.	Total loads.
Amount broughts forward,	34,891	28,235	63,125
Sixth District, Ninth and Tenth Wards:	3,726	8,819	12,545
Seventh District, Eleventh Twelfth Wards:	3,567	6,838	10,405
Eighth District, Thirteenth and Fourteenth Wards:	2,623	9,974	12,597
Ninth District, Fifteenth Ward:	6,011	4,100	10,111
Tenth District, Sixteenth and Seventeenth Wards:	4,597	7,058	11,655
Eleventh District, Eighteenth Nineteenth and Twenty-fifth Wards:	7,939	2,638	10,577
Twelfth District, Twentieth Ward:	5,847	4,012	9,859
Fifteenth District, Twenty-third Ward,	912	00	912
Sixteenth District, Twenty-fourth Ward:	2,017	330	2,347
	72,130	72,004	144,134

COST OF LABOR AND CART HIRE.

	Labor.	Cart hire.	Total.
First District, First, Second & Twenty-sixth Wards—	$3,778 65	$8,828 00	$12,606 65
Second District, Third & Fourth Wards—	3,339 22	8,167 50	11,506 72
Third District, Fifth Ward—	2,423 74	4,976 25	7,399 99
Fourth District, Sixth Ward—	2,214 51	4,869 50	7,084 01
Fifth District, Seventh & Eighth Wards—	3,319 39	8,482 25	11,801 64
Sixth District, Ninth & Tenth Wards—	2,683 19	7,931 25	10,614 44
Seventh District, Eleventh & Twelfth Wards—	2,119 69	5,589 00	7,708 69
Eighth District, Thirteenth & Fourteenth Wards—	2,652 53	7,299 50	9,952 03
Ninth District, Fifteenth Ward—	2,177 10	3,904 50	6,081 60
Am'ts carried forw'd,	$24,708 02	$60,047 75	$84,756 77

	Labor.	Cart hire.	Total.
Amt's brought forw'd,	$24,708 02	$60,047 75	$85,355 77
Tenth District, Sixteenth & Seventeenth Wards—	2,654 00	5,775 00	8,429 00
Eleventh District, Eighteenth & Nineteenth & Twenty-fifth Wards—	2,983 77	4,134 75	7,118 52
Twelfth District, Twentieth Ward—	1,761 03	3,418 50	5,179 53
Fifteenth District, Twenty-third Ward—	244 19	156 00	400 19
Sixteenth District, Twenty-fourth Ward—	495 45	738 75	1,234 20
	32,846 46		
Labor on dumping ground, wharves, &c.	785 15		
Total,	$33,631 61	$74,270 75	$107,902 36

Number of laborers and carts employed in the several Districts, and cost per load for sweeping the streets and removing the dirt therefrom.

	Laborers.	Cost per load for sweeping.		Cost per load for removing dirt.
First District, First, Second & Twenty-sixth Wards—	12	30 cts.	12 carts.	53 cts.
Second District, Third & Fourth Wards—	10	44	12	60
Amt's carried forward,	22		24	

	Laborers.	Cost per load for sweeping.	Carts.	Cost per load for removing dirt.
Amt's brought forward,	22		24	
Third District, Fifth Ward—	8	50 cts.	6	61 cts.
Fourth District, Sixth Ward—	8	71	7	50
Fifth District, Seventh & Eighth Wards—	12	46	12	56
Sixth District, Ninth & Tenth Wards—	10	72	10	63
Seventh District, Eleventh & Twelfth Wards—	8	59	8	53
Eighth District, Thirteenth & Fourteenth Wards—	10	101	11	57
Ninth District, Fifteenth Ward—	8	36	6	38
Tenth District, Sixteenth & Seventeenth Wards—	9	57	8	49
Eleventh District, Eighteenth, Nineteenth & Twenty-fifth Wards—	12	37	6	39
Amt's carried forw'd,	107		98	

	Laborers.	Cost per load for sweeping.	Carts.	Cost per load for removing dirt.
Amt's brought forw'd	107		98	
Twelfth District, Twentieth Ward—	7	30 cts.	4	34 cts.
Fifteenth District, Twenty-third Ward—	3	25	1	17
Sixteenth District, Twenty-fourth Ward—	3	24	2	31
	120		105	

Average number of loads swept per day by each laborer 3; wages $1 35 per day. Average cost per load for sweeping 45 cents.

Average number of loads removed per day by each cart employed 6; cart hire $3 00 per day. Average cost per load for carting 51 cents.

From the date of the organization of this Department, March 1, 1864, until the 31st day of December following, a period of ten months, *seventy-two thousand and four* loads of ashes were removed.

In consequence of the more tedious work of collecting and loading ashes, and the greater distance they have to be conveyed to reach the dumping grounds, the cost per load for removing them is greater than for removing the street dirt, being about fifty-seven cents, which makes the amount expended for that service alone during the last year, forty-one thousand and forty-two dollars and twenty-eight cents.

The ordinance under which this Department is organized provides for the removal of ashes from workshops and other places where large quantities are daily made. The delay caused by the removal of these ashes, which amount frequently to cart loads in a day, and placed there at irregular periods, prevents at times the prompt removal of those put in

front of the residences of citizens on the days appointed by the Department.

This delay is the cause of frequent complaint. For this reason, and for the better one, that the public should no more be compelled to remove the ashes from a factory or foundry than the shavings from a carpenter's shop or the rubbish from a building after the contractor has finished his work, I would suggest the repeal of so much of the ordinance as requires the removal of ashes from establishments of this kind, and the adoption of an amendment to the effect, that this Department shall not be required to remove them from other than private residences, and then only when placed on the footway in front of the premises, in vessels convenient for loading, and not weighing with the contents more than forty pounds.

The ordinance further requires that the ashes shall be removed in covered carts. The City owning no carts, the Department has to depend upon hiring them. It has been found impossible to get them with covers, or those that are in any way calculated to do the work properly and without annoyance to the citizens. The owners of carts are unwilling to incur the expense of covers, as they are liable at any time for cause or want of employment, to be discharged; in that event their covered carts would be unfit for any other kind of work.

In order to enable the Department to comply with this wise provision of the ordinance, I would recommend that Councils provide carts properly constructed for this service, and for the removal of street dirt, kitchen garbage, and offal. There would be economy in the use of carts of this kind, as a much greater quantity could be taken at a load, and the cause of frequent complaint entirely removed.

Twenty-eight thousand nine hundred and forty-three loads of ashes were sold during the past year, for the average price of nine cents per load. This shews that forty-three thousand sixty-one loads were, for want of purchasers or suitable dumping grounds, thrown away or entirely lost to the City.

In order that the City may have the benefit of these ashes, I would suggest that the grading of streets, when ordered by Councils, and the filling of ponds and low lands, when directed by the Board of Health, be given to this Department.

The City has on the Alms-house grounds a river front of several thousand feet, which to low water mark contains many

acres of land, now entirely useless. This land, if wharfed, could be made the receptacle for years to come of all the ashes taken up in the southwestern part of the City.

The completion of the Chestnut street bridge will render this a convenient dumping ground, and by its close proximity to the work make a great saving to the Department in the cost of carting.

The union of all the principal railroads connecting this City with the north, south, east, and west, at or near this point, with the improvements now in progress, or those contemplated in this locality, justifies the belief that these wharves and landings will be required long before the work here proposed could be completed.

There were seventy-two thousand, one hundred and thirty loads of dirt removed from the streets during the ten months of last year, ending December 31. Of which amounts, twenty-nine thousand six hundred and eighty-eight were sold, the average price obtained for it being a fraction over twenty-four cents per load. It is estimated that there were on the dumping grounds on the 31st day of December, four thousand loads, which shows that thirty-eight thousand four hundred and forty loads being unsaleable, were thrown away.

When this Department commenced operations, the streets had not been cleansed for a period of nearly eight months. There was an accumulation of mud, filth, ashes, and other refuse matter, such as was never before witnessed in Philadelphia. In some of the smaller streets in the lower part of the City, hundreds of cartloads of this disease-engendering filth were removed from a single square. It was no unusual thing to find in the larger and more frequented thoroughfares and business streets piles of dirt, ashes, and filth, containing twenty or thirty cart loads.

The greater part of the dirt taken up in March, April, and May, being mixed with ashes, was unsaleable, and was thrown away, or received by the purchaser as half loads only. So very offensive was some of this stuff that at times great difficulty was experienced in finding places to deposit it.

Seventy-four thousand two hundred and seventy dollars were expended for cart hire during the first ten months of the existence of this Department.

With carts properly constructed for this service, and placed in the care of sober, industrious men, under the faithful su-

pervision of the officers detailed by the Mayor for that purpose, this work could have been done for a much less sum.

The Department is compelled at times, when there is full employment on other work for carters, to take those that have neither horses or carts in any way fitted for the business.

It frequently occurs that the carters, finding employment more congenial or profitable elsewhere, leave without giving notice of their intention to do so; in this case the ashes or dirt, as the case may be, remains on the street for days, or until another carter can be employed to fill the vacancy, the Department meanwhile receiving the censure of the public for this seeming neglect of duty.

After the experience of the past year, I am convinced that the work of cleansing the streets can never be done promptly or satisfactorily, and with due regard to economy, with carts temporarily employed for that purpose.

The cost of labor in cleaning the streets and inlets was thirty-three thousand six hundred dollars, and for purchasing and repairing tools one thousand seven hundred dollars, making a total of thirty-five thousand three hundred and eighty-three dollars.

With the view to lessen this expense, experiments were made during the summer with the sweeping machine invented by Critcherson, of Boston. The result of these trials, which were continued for several days upon some of our roughest streets, was very satisfactory, as far as its capability to do the work is concerned. There was not sufficient time to test the economy of its use, Councils having made no appropriation to pay the expense of employing machinery upon the streets.

Those who witnessed the working of this machine were convinced of its superiority over hand sweeping, as it performed the work thoroughly and expeditiously.

Councils having in the appropriation for this year included an item for the employment of machinery in cleaning the streets, a further trial of Critcherson's machine will be made, in order to test its economy over hand labor, as soon as the condition of the streets will permit.

The greater portion of the dirt taken from the streets in the outer Wards, being clay or loam carried there by the wheels of the vehicles from the adjacent roads and unpaved streets, is unfit for manure, and of course unsaleable.

The removal of the gravel spread upon the streets by con-

tractors and railroad companies has been a heavy expense to this Department. I would recommend that Councils pass an ordinance requiring parties placing gravel upon the streets to remove it at their own cost when notified by the Mayor or Chief Inspector of Streets.

Much difficulty has been experienced in keeping the inlets to the sewers properly cleansed and free from obstructions. They are frequently out of repair, and so filled with the falling of the bricks of which they are constructed, or with the rubbish washed from the streets that they cannot be cleansed without removing some of the masonry. In this case it is necessary to notify the Commissioner of Highways, whose duty it then is to examine the place complained of, and, if he thinks it necessary, send men to make the required repairs. There is necessarily some delay in this routine, and meanwhile the citizens are suffering a great annoyance, and the property in the vicinity liable to damage from overflow.

In order to remove this evil, I would suggest that all repairs to inlets and sewers should be placed under the Chief Inspector of Streets.

When it is remembered that on the first day of March, 1864, the time the Chief Inspector and those delegated to assist him entered upon their duties, there was no kind of organization for cleansing the streets, no laborers, carts, tools, or implements with which to begin operations; that all these had to be procured, and forces organized for the various police districts, and that there were more than three hundred miles of paved streets, with the accumulated mud and filth of eight months upon them to be cleansed, that those to whom this duty had been assigned, were inexperienced, that time was required to establish system and bring order out of confusion, some degree of allowance will be made, if the Department has not fully realized the expectations of the public.

I acknowledge myself under deep obligations to your Honor for the advice and assistance you have at all times so kindly rendered me, in organizing and conducting this Department.

I remain yours,

Very truly,

MAHLON H. DICKINSON,

Chief Inspector of Streets.

Sam'l L. Smedley
Mar 28. 72

DEPARTMENT OF SURVEYS.

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR

OF THE

CITY OF PHILADELPHIA.

R-1166

Submitted to the Mayor January 7th, 1867.

PHILADELPHIA:
T. C. MARKLEY & SON, PRINTERS, GOLDSMITHS HALL, 422 LIBRARY STREET.
1867.

REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR

OF THE CITY OF PHILADELPHIA.

DEPARTMENT OF SURVEYS,

PHILADELPHIA, *Jan.* 7, 1867.

To the Hon. MORTON MCMICHAEL,
Mayor of Philadelphia.

SIR:—In obedience to your directions, I hereby present a statement exhibiting the appropriations to and the disbursements by this Department, during the year 1866, and also a report relative to the condition of such works as have been under its supervision.

General appropriation, ...	$30,923 20
Which has been expended as follows:	
Expenses, General Office, ...	$19,005 46
Salaries of District Surveyors, . . .	6,000 00
New surveys, revisions and landmarks, .	3,736 33
Balance of appropriation to merge, . .	2,181 41
	$30,923 20

The following sectional plans of survey and revisions have been filed during the year:

No.	Title.	Approved by Board.
13. Revision of grades,	Poplar St. from 29th St. to Pennsylvania avenue.	Jan. 15, 1866.
118. " "	Between 9th and 13th and Berks St. and Susquehanna avenue.	May 24, "
13. Widening of Poplar St.	Between West College av. and Pennsylvania avenue.	Oct. 1, "
72. Revision of grade.	Main St., Manayunk.	Oct. 15, "
207. Lines and grades.	5th Sec. late township of Bristol.	
214. Lines and grades.	11th Sec. Twenty-second Ward.	

The following is a list of sewers authorized by the Board of Surveyors during the year 1866:

Location.				Size. Ft.	In.
Nineteenth St.,	from	Penn'a avenue	to Green street,	3	
Front St.,	from	Thompson	Girard avenue	3	
Hamilton "		Nineteenth	Twentieth street	2	6
Brighton "		Fifteenth	Broad "	2	6
Barclay "		"	Broad "	2	6
Twenty-second "		Sansom	Locust "	2	6
Sixth "		Indiana	Clearfield "	3	
Market "		Fortieth	Forty-first "	2	6
Levant "		Pear	Southward		8
Eighteenth "		Master	to Seybert "		8
Hackley "		Fourth	Fifth "	3	
Fourth "		Hackley	Norris "	3	
Monterey "		Twelfth	Thirteenth "		10
Oxford "		Palethorp	Bodine "	2	6
Nectarine "	bet.	Eighth	and Ninth "		8
Market "		Thirteenth	and Juniper "		10
Master "	from	Thirteenth	to 105 feet west	2	6
Juvenal "		Walnut	Sansom street		10
Bay "		Sixth	280 feet west		10
Fitzwater "		Twelfth	Juniper street	2	6
Eighth "		Noble	Green "	3	
Hutchinson "	bet.	Poplar	and Girard avenue		10
Fourth "		Colum'a av.	and Oxford street,		8
Green "	from	Tenth	to Eleventh street,	2	6
10 ft alley	bet.	2nd and 3rd	and south from Arch street,		10
Pine "	from	Fifth	westward		10
Otis "	bet.	Memphis	and Tulip street		8
Rhoades "	from	Eighteenth	to Nineteenth street	2	6
Hancock "		Norris	northward		8

Jefferson	St. from 13th St.	to 90 feet east of Cadbury av.	2	6
Callowhill	" bet. 24th	and Twenty-fifth streets		8
Eleventh	" Montgom'y	and Columbia avenue		10
Cuba	" Morris	and Moore streets		10
Apple	" from Norris	northward	2	6
Alder	" Poplar	to Girard avenue	2	6
Market	" Forty-First	Wyoming "	2	6
Oxford	" Mifflin	W. of Sixth street	3	
Fifteenth	" Sp'g Garden	Brandywine "	2	6
Brandywine	" Fifteenth	Sixteenth "	2	6
Norris	" Almond	Girard avenue	2	6
Germantown road and Oxford St.	b. Mifflin	and Columbia avenue.		
Spruce	St. bet. Fifteenth	Sixteenth streets	2	6
Ninth	" Chestnut	Market "	2	6
Poplar	" from Broad	to Fifteenth "	2	6
Chestnut	" Fortieth	400 feet westward	3	
Fortieth	" Chestnut	Locust street,	3	
Locust	" Fortieth	350 feet westward	3	
Fifteenth	" Lombard	Pine street	3	
Arch	" bet. Eleventh	and Twelfth street		10
Julia	" Coates	Brown "		10
Linn	" from Twenty-third	to Twenty-fourth "	3	
Walnut	" Seventeenth	Eighteenth "	2	6
Mt. Vernon	" Tenth	Eleventh "	2	6
Green	" Eighteenth	Nineteenth "	2	6
Twelfth	" Spruce	Pine "	2	6
Twenty-third	" bet. Arch	and Cherry "		10
Second	" Race	Vine "		10
Gaskill	" Fourth	Fifth "		10
Thirteenth	" from Arch	to Wager "	2	6
Arch	" bet. Second	and Third "		10
Parrish	" Ontario	Broad "		10
Buckley	" Fifth	Sixth "		10
Sixth	" from Dauphin	to Germantown road	2	6
Twentieth	" Arch	Race "	3	
Outlet	" Twenty-first	Twenty-second "	2	6
Pemberton	" Wallace	southward		10
Second	" bet. South	and Lombard "		10
St. Mary's	" Sixth	Seventh "	2	6
Charlotte	" George	Culvert "		10
Third	" Race	Vine "		10
Levant	" Pear	Spruce "		10
Cherry	" Sixth	Seventh "		12
Barclay	" from Broad	to Fifteenth "	2	6
Davis	" Twelfth	60 feet westward		10
Naudain	" Eighteenth	206 "		10
Bingham	" Spruce	140 feet northward		10
Summer	" Twenty-first	Twenty-second "	2	6
Water	" bet. Spruce,	and Pine "		10
Eighth	" Cherry	Race "		10
Charlotte	" Brown	Poplar "		10

Germantown road bet		Master and	Thompson	street	10
Front	St.,	Callowhill	Willow	"	8
Little Pine	"	Sixth	Seventh	"	10
Callowhill	"	Canton	Ridge avenue	"	12
Washington av.		Front	Swanson	"	12

Upon the most important question of drainage, I am gratified in being able to state, that, since the enactment of the ordinance regulating the assessment upon property for the construction of sewers, the public have shown their entire approval of the system as well as of the amount of assessment there ordered ($1\frac{25}{100}$ per ft. of front), by the large number of applications for sewers which have been presented to and acted upon by the Board of Surveyors since May last. The amount of lineal assessment as yet, does not cover the cost of sewers, notwithstanding the City assumes the payment of the street intersections, and such portion of the length of sewer as may be deducted for corner lots, (one-third the frontage, with a maximum of fifty feet.) To enable us, therefore, to proceed with the sewer constructions, authority was granted by Councils to draw upon the appropriation made for the Highway Department, to the amount of $300 for each sewer contract; and, under this privilege, many sewers have been constructed which otherwise could not have been built unless the property owners had furnished the deficiency required. As to the requirements of the City in the extension of sewers, I would refer to the report presented to Councils through the Committee of Surveys and Regulations, on July 5, 1866, to which is attached a bill appropriating $822,000 for constructing arterial sewers, and making certain changes where depressions of grade cause too rapid an accumulation of surface-flow at one point. There are many other lines necessary—enough, in fact, I believe, to cover an expenditure of $1,000,000.

The bill to "Promote Public Cleanliness and Health," which was again before Councils during the past year, I regret to say has not been favorably received by the Common Branch, and consequently the connections for privy wells, so much complained of by the Board of Health, as well as this Department, continue to be constructed, and by persons whose experience in such work would not warrant their being so employed. Much work thus done requires repair at the expense of the City, sometimes after great injury has accrued to the

property intended to be drained. The enactment of this bill would place the construction of all sewer connections with private houses entirely under the control of the City, prevent the pollution of sewers, either by the overflow of cess-pools, the refuse of slaughter-houses or factories, and correct the open gutters over the sidewalks *where they may be a nuisance, or dangerous from the accumulation of ice.*

The hope and desire of this Department has been, that by legally preventing the cess-pit connections we should gradually abolish the use of cess-pools, or previous privy wells; or at least prevent, to a great extent, their increase by the more general use of the water closet connection with the sewer, which, it is believed, will correct a great evil, and not by entailing a greater one upon the public as some have intimated; for our sewers generally, with the free use of water, as is requisite by the water-closet arrangement, would carry off all fecal matter that may be delivered into them, without any danger of deposit. I do not wish to be understood as setting forth the present water closet system as perfected, for it has its objectionable feature in the fact that their delivery flows through the sewers into the rivers; and large as is the capacity of our river Delaware in comparison with the Thames, and small as is our population compared to that of London, yet we have a large area of territory which may be as extensively and densely populated as either London or Paris; and notwithstanding many years may elapse before our population will reach a number which will bear the same comparison to our water capacity as London does to that of the Thames, yet it is not too soon to give a thought as to what shall be done with the sewage. More fears may justly be felt as regards the Schuylkill than the Delaware, for already have we at least twenty-five per cent. of our population delivering their refuse into it, and the progress of improvements in West Philadelphia has been and will continue to be very rapid.

The Delaware, *between the Island and the City*, has a delivery of about 12,000,000 cubic feet per minute, with about 500,000 people draining into it; the Schuylkill 2,000,000 cubic feet per minute, with about 200,000 of population. The Thames, at London, has a flow of about 4,000,000 cubic feet per minute, with a population of about 2,000,000 in the city and 900,000 additional above the city, and even then I find in a Parliamentary report of 1865, these words: "In the

"investigations relating to London sewage and its effects on "the Thames, and the injury to health inflicted thereby, it is "conclusively shown that the greater part of the nuisance "lies in the sedimentary matter which *lines the banks* and is "in an active state of putrefaction." I state this to show that we need not, even on the Schuylkill with one-half our water capacity and one tenth the population, have any *immediate* fear of injury to our rivers should we continue the water-closet system in preference to the cess-pits.

In several previous reports I endeavored to call attention to the necessity of abolishing, gradually, the use of cess-pits or privies. Nevertheless, as I have met with conflicting views from high authority in our midst, tending to the retention of cess-pits, on the grounds of the fertilizing value of their contents, I will again remark by quoting largely from reports made to Parliament, and say that local registrars in London record the heaviest death rates in districts where the cess-pit is used in preference to the water-closet, and the parish money is mostly spent by the relieving officer among the wretched inhabitants subject to this curse. The operation of cleaning is foul, mischievous and unremunerative, while the loss to the inhabitants in damaged health cannot be estimated. And further, that although streams and rivers may be fouled, yet it is distinctly asserted that the value of human life has been *increased in proportion as cess pits have been abolished* and refuse removed in water from the tenements; and it is believed that in many cases, though the cess-pit is condemned by the judgment of the parties, yet the fear of sewer charges are by them more dreaded; *i. e.*, the health of the community is by them measured by money value. Cholera, from which we have been so wonderfully spared during the past season, requires fermenting filth, foul air and squalor—and these elements are necessary to grow such diseases before they can prevail and become epidemic; and therefore, "as com- "pared with privy and cess-pit, the water-closet is a vast "improvement, and if drain, sewer and water supply are "complete, no fouling of the urban atmosphere or sub-soil "can take place; from a well drained house and completely "sewered town, all refuse is removed at a rate of *at least* one "mile per hour. Dry closets, of every description, are ne- "cessarily social abominations in a town."

As to the utilization of sewage, there has been much writ-

ten and many experiments tried, the result of which appears to be that there is no known or tried form of precipitating sewage so as to obtain a portable solid manure that has ever been made to pay in Great Britain; and that, if the sewage from a city can be distributed upon meadow land by gravitation—as pumping adds too greatly to the expense—then large and frequent crops of grass may be obtained and the system be remunerative. Yet even this cannot be asserted as applicable to all localities, for in its result it is entirely subject to local contingencies.

At Edinburg, the system, under peculiarly favorable circumstances, has been more successful than at any other place; and even here where the distribution by gravity has been substituted by pumping, there has been loss, though the height raised was but trifling.

At Rugby, with a population of about 6,000, the sewage is pumped, and was arranged to be distributed for the irrigation of 470 acres. After eleven years of trial, the irrigating area has been reduced to 120 acres and found to be inapplicable to any other crop than grass. In many other towns in England, such as Croydon, Watford, Alnwick and others, the results are the same.

It is also decided that if more than 5,000 tons of sewage is distributed per annum upon an acre of meadow, that there is waste, and the water therefrom will pass off without being purified, and therefore with much of the fertilizing properties of the sewage in solution, still carrying its polluting effect to the streams. If properly applied, there is no better purifier than the meadow soil, from which sewage will flow, clarified, free from its deleterious solvents, and can be used without fear or inconvenience.

To be remunerative to the farmer, he cannot afford to pay more than one cent. per ton upon his land, the sewage to be delivered to him, and estimated clear of the storm water—but including, of course, the general water supply and drainage.

The quantity of sewage that is due population, is found to be 100 tons per head per annum, including rain fall and subsoil water, or 60 tons exclusive of storm water; therefore it would require the excretal and other matters of fifty individuals to supply the requisite quantity for one acre; or, for the City of Philadelphia, with an estimated population of 800,000, an area of about 16,000 acres.

It would be difficult to apply this irrigating system for the entire section of our City lying between the rivers, without enormous expense, as the area of meadow, in what is termed "the Neck," is but about 5,000 acres, sufficient only for the sewage of a population of 250,000 souls, while but *a portion of this* could be reserved for such purposes so rapidly are improvements advancing in that direction. In fact, I believe that that entire area will be occupied for commercial and manufacturing purposes before the necessities of the City require a resort to such or a similar project. For that portion of the City lying west of the river, it may be found feasible to make use of the extensive meadows between the river and Darby creek, which, I believe upon examination, would be well adapted to the purposes, and throw the surplus of drainage into the Delaware by that creek; and when in the future the time should arrive that an expenditure of $30,000,000 would be considered as a necessity, (as of late in London,) these meadows and this creek will be found of great importance in devising a general plan for such expenditure.

Several methods of utilizing the excreta of the population, exclusive of sewage and without cess-pits, have been suggested both abroad and among ourselves, which are entirely practicable, but with such a marked innovation upon our accustomed habits as to cause difficulty of their introduction, all of which adopt the first principle that all such matters should be carried off from about the neighborhood of residences as speedily as possible. Was this taken from our sewage there remains what may be more easily dealt with, viz, the manufacturing refuse and the offal from slaughter houses. The latter should be dealt with summarily and as soon as possible, for there are but few of our arterial sewers that are not horribly polluted with the refuse of these establishments; and our river gives evidence that some arrangement ought to be made by which we should be relieved, at least from those nuisances which are repulsive both to smell and sight. Our sister cities are advancing in these particulars more rapidly than we are, as they have already at Chicago and New York authorized abattoirs or general slaughter houses, whereby the City is relieved from all those annoyances, and if properly managed, insure healthy flesh for the market.

All the bridges belonging to the City are now in good re-

pair, and the new structures which were in progress at the date of my last report, are so far completed as to be open for public travel. At Penrose Ferry it was found necessary to change the line of bridge and erect four new piers, one of which (the North draw pier) was built upon the old work; submarine examinations having been made, which proved the foundation to be secure, and that by the wash and settlement a rock bed had been reached by the crib; the superstructure and approaches are entirely new. It was thrown open to public travel on the 30th of October. In addition to the re-erection of bridge at an increased elevation, we are placing fenders at the pier heads as required, to facilitate navigation. The cost of this structure will be $62,000.

The Chestnut street bridge was open for the use of the Chestnut and Walnut Sts. Passenger Railway Company by its cars, on July 4th, 1866, and to the public generally so soon as the railing was in place, September 1, 1866. Some of the ornamental work is still to be fitted and the flag footway laid, before it can be painted for completion.

The Chestnut and Walnut Sts. Railroad Company gave us full authority to use their bonds, amounting to $100,000, so soon as they had the free use of the bridge, and the masonry contractors, Messrs. Clark, McGrann and Kennedy, have been paid their final estimate, which, computed upon the contract prices, amounted to $279,383 89, or $12,467 61 less than estimated cost as presented to Councils by this Department, $291,851 50. With the advance on prices, as directed in ordinance approved December 10, 1863, the final estimate amounted to $360,366 06

Which was paid as follows:

City Loan, ...	$292,866 06
Philadelphia City Pass'r Railroad Bonds, .	67,500 00
	$360,366 06

For the iron superstructure there is yet about $4,500 of work to do. Mr. Simons has now received in

City Loan	$100,210 00
Railroad Bonds, ...	14,000 00
Total, ...	$114,210 00

Leaving a balance payable under the limit of his contract of $20,367 00.

Upon the superstructure, no advance of price whatever has been made or even asked for until within the last month, when the application for relief, as made by the contractor to this Department, was sent to Councils; but as the contract was executed prior to the opening of the rebellion, with prices ruling at that time, there can be no doubt but that the amount expended upon the work by the contractor far exceeds what has been paid him by the City.

I beg leave to call your attention to the question of carriage-way paving, and the necessity of providing other material than the cobble stone, particularly for the horse-path of the City passenger railways, which, from such constant use in a given line, becomes so smooth that it is difficult for horses to keep their feet. The granite cubical block is a great improvement when prepared of proper material and not over three inches in width, set with open joint, as is shown by the great protection they afford when laid in alternate lengths alongside the rail of our passenger railways, the reduction in expenses of repairs will fully repay the first outlay. Another pavement which is extensively used and meets with great favor in our Western cities, is the Nicholson pavement, which was introduced in Chicago in 1856, St. Louis and Milwaukie in 1859, and where it is still being laid on their new thoroughfares. In Chicago, Wabash avenue has just been completed, and its continued use there, for now over ten years, proves it to be acceptable. It is also in use in Cincinnati, Cleveland, Detroit, Toledo, San Francisco, Elmira, and has also been laid in the city of New York within the past month. It is composed of wood with gravel screenings, but is entirely different in its construction from the wooden pavement which proved so great a failure in our City some twelve years past. The blocks of wood used are either white pine or a more common timber Burnetized; and in St. Louis they are using the cotton wood of the West, so prepared.

In arranging for this pavement, the earth between curbs, should be excavated to a depth of about twenty-two inches below the curb height, upon which a layer of gravel six inches deep should be laid, and after being carefully surfaced to the form of road, a layer of sand or fine screened gravel should be spread and smoothed to a regular and even surface; the

foundation of inch boards, dipped in a composition of coal tar and pitch, is then carefully laid upon the sand or gravel with a double course whenever there is a liability of uneven settling. Upon this are placed the blocks forming the roadway, which are six inches deep, three inches thick, and should not be over ten inches wide. These are set upon their ends so that the wear is upon the end of the fibre. As they are arranged in place in true line across the street, they are dipped in the composition of tar to a depth of four inches, and a small strip three inches wide and one inch thick is set against them lying close to the board foundation and nailed to the blocks at intervals of about eighteen inches, the nail so driven as to pass through the strip or picket into the boards below; after being so laid with ranges of blocks having one inch spaces between these spaces are filled with gravel screenings varying in size from a pea to a walnut, after which the coal tar composition is poured in hot, filling all the interstices; the gravel being previously heated, the tar is not chilled and suddenly hardened as it otherwise would, and should not be. In its composition, the desire is to so proportion the mixture that it shall not be brittle, but a sort of paste, accommodating itself to any movement of the blocks; this gravel is then rammed to place and the vacant space thus formed again filled with gravel and tar, and again rammed. After this the entire surface is spread with the tar and covered with screened gravel, when it is ready for immediate use. At street intersections, to prevent the line of travel running in the line of blocks, they are placed on a range diagonally with the lines of streets. As to the strength of this pavement a trial was made in San Francisco, and where a heavy locomotive was drawn over it, which, by its weight, tore the ordinary pavement into ruts, upon this there was no impression whatever. As to durability, they speak most favorably of it in Chicago where they have bought the right to use from the patentee, and I have in my office a block which was laid in Chicago in Nov. 1856, and taken up for examination in November, 1865, after a severe use of nine years. From a height of six inches, as originally laid, it is reduced to four and a-half inches, showing a wear of a little over one-eighth inch per year, while the timber is as free from decay as when laid; the top, of course, is broomed up and filled with gravel and small stones pressed into it by the travel, and the brooming projects about enough over the

thickness of the block to cover, with the adjoining block, the gravel space between them. Some objection has been made on the grounds of difficulty of repair, or of replacing it after being removed for water or gas connections. In this I am advised by those familiar with its use, that there is no difficulty if attended to with ordinary care, and I am inclined, in watching its construction on the experimental square in Broad street, to believe such to be the fact.

Among other advantages claimed and endorsed by some leading chemists in Boston, is that of healthfulness, from the fact that the tar used in its construction is a correction to nephetic gases.

Should this pavement prove acceptable, and I can now see no reason why it should not be, its general use will be a great saving to all who are at the expense of supporting horses and vehicles, whether for business or pleasure.

In the operation of the Registry Bureau, we have been more successful in obtaining descriptions of properties than we had anticipated, as we have now about 40,000 entered. Our books of record are prepared, covering the City plot from South street to Erie avenue, including Germantown and the Twenty fourth Ward, upon which 15,000 of the properties are plotted and entered in the general Index Book, showing the names of the present owners and also the transfers or sales of properties that have been made. The progress already made in this work is sufficient to be of great value in locating property for assessment, and will now be used by the Board of Revision; yet it is a matter of regret that the office of the Board is not immediately adjoining this Department, so that the books now in course of preparation could be used by them without the expenditure required in their duplication as directed by law. The yearly removal of the duplicates would be a serious matter, as also would be the loss of time on keeping them up with the originals. The cost of the work of duplicating would be, including cost of book, at least $80 for each volume, which, for the 200 volumes, would make an aggregate, in first cost, of $16,000.

I must again call attention to the insecurity of our official plans or maps of record, and earnestly ask that the subject may have its true weight with Councils. Although our fireproof is as well built as one of its kind probably can be, yet was our office building, or the house adjoining with its black-

smith's shop, to take fire, I fear the location of our fire-proof is such that it would, most probably, be destroyed, and with it much that can never be replaced, while what is necessary to be renewed would cost tens of thousands of dollars.

Much work has been done during the past year in opening Broad street for public travel from Columbia avenue to Fisher's lane; the graduation is nearly completed, but the bridge over the Reading railroad has not, as yet, been authorized by Councils, nor has it been absolutely necessary until now; but unless its construction is directed at an early day, so that it may be erected when the roadway is being ballasted, there will be an interruption to the travel upon this street which will be a great annoyance to our citizens. It is believed the Reading Railroad Company will make the same arrangement with the City with reference to this bridge as they have done with other similar structures, *i. e.*, that they will construct it upon such plan as may be approved by the City, the cost thereof to be divided equally between them and the City. I am not prepared with an estimate of it, but hope, at an early day, to receive a plan and proposition from the Company, which will be submitted.

The completion of this street, in accordance with proposed plan, and by the removal of the railroad tracks between South and Callowhill streets, will give us an avenue that we may justly be proud of, as we will then have a straight drive of 113 feet wide and ten miles long, with two miles of extension yet to open. Of this distance, about four miles is now paved, $2\frac{2}{10}$ miles under contract for paving, a-half mile curbed and not paved, and $3\frac{3}{10}$ miles in travellable condition. Its entire completion will be a great ornament to our City.

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

DEPARTMENT OF SURVEYS.

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR

OF THE

CITY OF PHILADELPHIA.

P-2

Submitted to the Mayor January 18th, 1870.

PHILADELPHIA:
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1870.

ANNUAL REPORT.

DEPARTMENT OF SURVEYS,
PHILADELPHIA, *January* 18, 1870.

To the HON. DANIEL M. FOX,
Mayor of Philadelphia.

SIR:—In compliance with your circular of the 17th of December, I herewith submit a statement of the general condition and business of this department for the year 1869; together with an account of all moneys received and disbursed:

Amount of annual appropriation to department, as per Ordinance Dec. 30th, 1868, -	$34,937 00
Special appropriation, per Ord. Oct. 9, 1868,	1,600 00
Total appropriations, - -	$36,537 00

The expenditures have been as follows:

Expenses, General Office,	
Registry Bureau and District Surveyors, -	$15,204 00
Plans for Fairmount bridge superstructure, -	1,625 00
New surveys, revisions and landmarks, -	18,231 24
Balance returned to Treasury, - - -	1,476 76
	$36,537 00

The receipts, as deposited with the City Treasurer, have been as follows:

From sewer permits and office charges, - -	3,589 70
" Registry Bureau examinations, - -	150 48
Total receipts, - - -	$3,740 18

The above includes the payments during the year 1869, by the City Passenger Railway Companies, for extra cost to the City of building sewers consequent upon the location of roads and keeping the same in operation while the sewer alongside is being constructed.

These charges for the years 1867 and 1868, amounted in the aggregate to $4,576 24, of which but $2,044 38 has been

paid, leaving the following companies indebted to the City, as noted below, viz. :

Second & Third streets,	$65 50
Chestnut & Walnut streets,	342 90
Race & Vine streets,	33 00
Seventeenth & Nineteenth streets,	136 20
Girard College,	86 50
Union,	418 50
Thirteenth & Fifteenth streets,	125 50
Spruce & Pine streets,	5 50
Green & Coates streets, 1867, $314 66 " " " 1868, 250 30	564 96
Fourth & Eighth streets, 1867, $97 00 " " " 1868, 144 90	241 90
Arch street,	234 30
Ridge avenue,	123 80
Schulkill river,	153 30
	$2,531 86

The extension of our City plans for the past year, so far as relates to new surveys, has been confined to the First, Twenty-second and Twenty-third Wards, covering an area of 2,739 acres, while much time has been consumed in the adjustment of revisions, made necessary by the erection of improvements, changing the character of the several localities.

The following is a list of plans filed :—

No.	Title.	Approved by Board.
16½.	Lines of a street connecting W. Walnut lane & Wissahickon av.	
16¼.	Revision of grades on Green street.	
71.	Re-survey of part of Fourth Ward.	Sep. 20th, 1869.
87.	Revision wharf lines on Schuylkill river, from Fairmount Park to South street,	Feb. 1st, "
121.	Revision of grades on Thompson bet. 26th & 31st sts.,	Dec. 20th, "
147.	Revision of lines & grades of 5th section of 23d Ward.	
165.	Revision of Evergreen avenue,	Oct. 18th, "
179.	Revision of Fifth section of First Ward,	
228.	Survey and Regulation 14th section 21st Ward,	Feb. 1st, "
230.	" " 13th " "	Mar. 1st, "
231.	" " 12th " "	Mar. 1st, "
232.	" " 9th " 22d Ward.	
233.	" " 10th " "	
234.	Extension of lines of Broad street,	Nov. 15th, "
235.	Survey and Regulation 6th section of 1st Ward.	
236.	" " 7th " "	
237.	" " 8th " "	
238.	Re-survey of Second and Third Wards.	
049.	Survey and Regulation 11th section 22d Ward.	
222.	Lines of Paoli street, 21st Ward.	

All plans of survey, whether of new area or revisions of old work, receive the careful examination of the Board of Surveyors, both on the ground and on plan, and also their official approval, before being submitted to the Court for final confirmation.

Much of the time of the Board of Surveys in session is occupied in the examination of petitions, asking for the extension of branch sewers, 131 of which have been acted upon during the past year, 128 of which have been constructed. Of these, 72 have been entirely at private expense, 43 under authority granted by the Board of Surveyors, based upon the signatures of a majority of the persons owning property fronting upon them, and 13 under authority of Councils expressed by ordinance; the latter being necessary whenever a majority of owners will not sign favorably, and the exigencies of the locality demand it.

The total length of branch sewers constructed during 1869 is 49,598 feet, or $9\frac{4}{10}$ miles nearly, the cost of which amounts to $136,317 57. Of this, $19,869 96 has been paid by the City, and $116,447 61 by the owners of property fronting on the sewers.

In many cases where the sewer is solely for the advantage of persons residing upon its line, whether in the management of the particular business in which they may be engaged, or for the drainage of their premises, without in any way benefiting the surface drainage, it has been customary to withhold any payments on the part of the City for its construction. This has caused an expenditure by property owners, over and above their assessed rates, of $2,126 22. Of the assessment bills prepared, $683 77 have been sent to the Department of Highways for collection, for the benefit of the City; thus reducing the sewer expense to the City for the year, by that amount collected.

In 1868, the length of branch sewers laid reached 32,664 feet, or $6\frac{1}{4}$ miles nearly, costing $75,963 77, divided between the City and individuals, as follows:—

City expenditure, - - - - - -	$13,394 56
Individual expenditure, - - - -	62,569 21
	$75,963 77

It is much to be regretted that, notwithstanding those con-

structing branch sewers at their own expense protect themselves from imposition (in having their sewers used by persons not contributing to their construction), by having their cost recorded in this department, yet such protection seems to be entirely inadequate; and our records, therefore, so far as regards sewers constructed at private expense, are exceedingly imperfect, forcing the conviction that no work of that character should be executed under private arrangements, except after being duly advertised and allotted by the Highway Department.

Parties desiring privilege to construct sewers for their own use, at their own expense, now receive privilege to do so from the Board of Surveyors, with an understanding that they have the work done under the superintendence of the District Surveyors, as directed by Ordinance May 12th, 1866. But this section of the law is practically a dead letter. The grant being received, no further attention is given to the provisions of that grant, and the District Surveyor is never advised either of its beginning, progress or completion; and our records, therefore, give no history of it, except that the privilege to construct was granted. An ordinance prohibiting the construction of any sewers in the public streets, excepting under a contract with the City, will correct this.

As regards private connections with sewers, of which so much has been written, in the endeavor to show the serious injury our sewers sustain by having inexperienced or careless persons tampering with them, I would say that, owing to the Supplement of July 15th, 1867 (as stated in my report of January, 1868), the Ordinance "To Promote Cleanliness and Health," so carefully drawn and long considered, both in Committee and Chambers, has become entirely ineffective. This department issues permits, but knows nothing of the mode of their construction. And we feel assured that a large number are made without even the form of an application for permit; while in many cases, the permit granted is not conformed to, either as to the character or amount of drainage applied for.

I feel assured that, was the location of every private sewer connection known and recorded in this department, as they should be, the annual return for sewer rental would be largely increased, and we would find a large proportion of them had been constructed without any authority whatever.

Was the original Ordinance of March 9, 1867, "To Promote Cleanliness and Health" in force, we should have a guard against this in the person of the licensed inspector, as would be *his interest* to watch such violations of the law, and the City thus be benefited both in revenue and in item of repairs to sewers. I earnestly plead for the repeal of the Supplement of July 15, 1867. It would save much in sewers repairs, if pipes for house connections were built in the sewers as they are constructed, and a small charge, covering the cost, placed upon the bills of assessment; this would prevent the sewers being broken into after completion, to their serious injury. Experience has drawn us to this practically, as is shown by our return of permits for the years 1868 and 1869, where, for the former year, with only 784 permits, our returns were $3,090, while, for the latter, with 848 permits, we return but $2,950. This results from the fact that as new sewers are being constructed, persons residing upon their lines arrange with the contractor to make their connections; and as the street-paving is already disturbed, and they pay their sewer assessment bills to the contractor, the usual permit is obtained without other charge to the City than the yearly rental.

During the year there has been constructed 179 public inlets to sewers, each of which, when properly built, and attended when built tends to the increased healthfulness of the City by reducing the length of surface-flow in gutters, and the accumulation of garbage, with the deleterious effect its decomposition has upon our breathing atmosphere. Our efforts to do away with objectionable gutters crossing the footways have been only partially successful; whenever a complaint of such a gutter is presented, an examination is at once made, and a report submitted to the Committee on Surveys and Regulations; upon their approval, notices are at once sent to the properties from which the objectionable drainage is discharged, as by law directed. This done, we have no means of knowing whether our notices have been regarded or not, as there is no officer of this department whose services could be spared for such duty.

Whenever those particularly interested have advised us that the notices of the department have had no effect, the case is promptly referred to the City Solicitor, by whom suit is

instituted, a fine imposed, and the source of complaint removed.

Again, by Ordinance of March 9, 1867, Sect. 8, it is made the duty of all persons, either erecting new houses or altering old ones upon the line of any sewer, to provide underground drainage from such premises by connections with the sewer; yet, important as this law is, it is entirely disregarded, from the fact that there is no one whose duty it is to examine for and report upon such facts. Other cases of violation of law in which this department is deeply interested, but is powerless to correct, may be laid before you, such as the very many encroachments upon our footways by railings that are "not around excavated areas," and yet extend beyond the house line so as to reduce the width of footway below that specified in ordinance, and the numerous door-steps that extend into the public street beyond the preseribed limit of law; but, as before, there is no officer in this department whose time could be spared to make the required investigation.

The work of constructing the main sewers ordered by Ordinance, April 24, 1868, has progressed satisfactorily.

The following exhibits those that have been finished, with the cost:—

Location of Sewers.	Diameter.	Length.	Total Length.	Cost to City.	Cost to Property Owners	Total Cost.	Lengths of different sized Sewers.	
							Sewers.	Feet.
Brown street, Franklin to Parrish	5.0 feet 4.6 "	696 feet 1,207 "	1,908 feet	$26,562 39	$1,620 43	$27,182 82	2 feet	12,755
Eleventh street, Christian to Washington avenue	3.0 "	853 "	853 "	2,049 85	766 75	2,816 60	3½ "	525
Eighteenth street, Vine to Spring Garden	3.0 "	1,670 "	1,670 "	3,284 58	2,528 72	5,768 30	4 "	634
Gunners' Run, Broad St., Clearfield to Twenty-second and Tioga	8½ ft. 6 ft. 7½ ft. 5½ ft. 7 ft. 4½ ft. 3½ ft.	671 ft 887 ft 1,110 ft 634 ft 919 ft 525 ft 528 ft 530 ft 433 ft	6,287 "	54,491 18	14,362 78	68,853 91	4½ "	2,094
Locust street, Nineteenth to River Schuylkill	3.0 feet.	2,270 feet	2,270 "	3,469 36	4,392 44	7,861 80	5 "	696
Mifflin street and Montgomery avenue	10 "	1,093 "	1,093 "	43,947 72	2,770 28	46,718 00	5½ "	433
Seventeenth street, Vine to Spring Garden	3 "	1,670 "	1,670 "	4,195 43	1,817 57	6,013 00	6 "	528
Twelfth street, Christian to Shippen	3 "	1,014 "	1,014 "	1,424 77	1,916 03	3,340 80	7 "	1,071
Thirty-sixth, Warren and Thirty-seventh street	3 "	956 "	956 "	2,833 73	1,589 27	4,423 00	7½ "	1,110
Washington avenue, Broad to Seventeenth	3 "	1,859 "	1,859 "	3,054 37	1,075 43	4,129 80	8½ "	671
Walnut street, Thirty-third to Thirty-eighth	3 "	2,433 "	2,433 "	7,408 22	4,861 53	12,269 75	10 "	1,093
Alteration (cave) Eighteenth and Vine	7 "	152 "	152 "	3,265 80		3,265 80		
			21,610	$154,937 35	$37,701 23	$192,638 58		21,610

The eastern Cohocksink sewer, located on Laurel street, from the Delaware river to the creek, was commenced in May last, at the river end, and at once it was found necessary to contend with quicksand, a material of all others most dreaded by the engineer in works of construction. In this case it was particularly to be dreaded, as the sewer lies in a street fifty feet wide, built upon both sides; recourse was had to such expedients as were thought judicious to prevent not only the loss of the houses upon the street, with its attendant expense, but any delay in the completion of the work that such difficulties would entail upon us. These expedients have been successfully carried out by the contractor so far, and I trust that we may yet accomplish our work, without in any serious way affecting the structures upon its line. The expense will, of course, necessarily exceed what had been estimated for this work, as quicksand was entirely unexpected. We have now laid in this work 300 feet of sewer, 169 feet of which has been changed in form from that designed, for the purpose of narrowing the excavation between the houses. At Beach street we will return to the shape originally designed, a flat, elliptical arch, on account of the low elevation of street grades. I see no reason why this work should not be completed during the year 1870.

The sewer upon Mifflin and Montgomery streets, which we feared would in its construction be attended with many difficulties from freshets, being in a narrow open channel, has been successfully completed without the occurrence of any flood to interfere with its progress. This has been most fortunate, as that stream (Cohocksink) frequently rises so as to fill the channel to its highest level, with a torrent capable of carrying off any incomplete work that would oppose its current. We have on this line done more work of embankment than was originally provided for, rendered necessary as a protection to the brick and stone work in the sewer.

The upper Cohocksink, or that section lying between Ninth and Berks streets, and Dauphin and Sixteenth streets, is the largest work of the kind that has ever been constructed in our City. For its greater length it lies in the valley of the stream, but at Eleventh and Broad streets it is a cross country line, subjecting us to heavy rock cutting. It has been worked with great energy, and been well done; that portion under the Germantown Railroad required great cau-

tion and experience, as the risk was an unusual one, the railroad company would assume no liability whatever, thus throwing the entire burden and responsibility upon us. To insure safety to the very many heavily laden passenger trains crossing this opening, we erected a Howe bridge with three trusses, under which, with heavy shoring, our work was completed and the gap in the railroad filled without the slightest accident. This work will be completed about the first of April.

The sewer upon Broad and Tioga streets has also been finished, without meeting with any difficulties of moment. Its completion prepares a large area for building purposes, and increases very materially the value of not only the vacant ground through which it passes, but also each and every improved property on Tioga street, as far as the township line road.

The Brown street sewer, though small comparatively as to capacity, extending from Franklin street by way of Eleventh street to Parrish street, was built to correct the imperfections in the Parrish street sewer, by cutting off its drainage west of Eleventh street.

This was a particularly troublesome piece of work, as it was found necessary to lay the sewer in quicksand rendering close street piling and a wooden cradle the entire length of Brown street. The care and attention bestowed upon this work saved us heavy expense in restoring curbs and footways.

The Mill Creek Sewer, the largest that will be required within our City area has a capacity of 302,000 feet per minute, and drains an area of 4,600 acres. It was commenced during the summer, and so far has progressed uninterruptedly. At Spruce street there are 400 feet of invert completed, lying in the open valley; and in the heavy rock excavation between Spruce street and the Baltimore Turnpike, there is a heavy force at work, not only opening up a trench for the sewer, but obtaining material for the energetic prosecution of the work as soon as the weather will permit the use of mortar. This work is subject to great danger from floods, and will require, on the part of the contractor, the greatest watchfulness and care, so as to be ready for any emergency.

The alteration of the sewer at Eighteenth and Vine, with the branches constructed on Seventeenth and Eighteenth streets, for the purpose of intercepting the surface flow which accumulated at Eighteenth and Vine streets, has, we believe, corrected the difficulty; but as some complaint has been presented that the cellars in the neighborhood have back water forced in them in times of heavy rain fall, I must say that so long as their connections with the sewer and cellars are below flood level in the sewer and unprotected by a valve, this must occur. The City cannot be expected to construct a sewer of such width as to reduce the flood level inside of it sufficiently to prevent a head of water upon these connecting drains.

The sewers built on Eleventh, from Christian street south, and on Twelfth street, from Christian street north, though performing valuable functions, yet it may be owing to the want of care in keeping the inlet free, they do not fulfil the duty expected in preventing the flooding in the basin at Twelfth and Washington streets. We would therefore recommend that the old sewer on Twelfth street, from Christian street to Washington street, be replaced by another of larger capacity.

The bridges are generally in good condition, those on the Wissahickon are all in order, and having been roofed and weather boarded, may be considered secure for many years, so far as regards durability of material.

The Falls Bridge over the Schuylkill river is in good order, and is kept clean, a most important point for timber bridges, paticularly.

The Girard Avenue Bridge is by no means in a satisfactory condition. The western span is trestled at the abutment, and I believe the arches now carry the most of the load, in fact, without them, the trusses could not, in there present condition, be safely entrusted with that duty. The importance of this bridge has greatly increased during the past year owing to the opening of Fairmount Park on the west side of the river, as the travel has as many as 1,500 vehicles, crowding it to its utmost capacity, with two lines of carriages for several hours during the afternoons; it becomes a matter of the utmost importance, that so thronged a thoroughfare as this needs must be, should be as to security in all points

reliable. The renewal of this bridge is a matter for early consideration.

Some repair is required on the Suspension Bridge at Fairmount, and was it not, that Councils have within a short time approved a plan for a new structure at this site, I should feel compelled as a precautionary measure to suggest renewing the cables of the present bridge, not that there is any particular reason to doubt their security, but because there is no means of knowing what their condition is. The early erection of the proposed structure is most imperative for the protection of our people who are driven of necessity to the use of Bridge street in reaching their residences and places of business, and are now subjected to the dangers of crossing the Pennsylvania Rail Road.

The Market Street Bridge is in good order, but its roadway should be kept more from the accumulation of the street dirt. A renewal of its roadway planking will be necessary at no distant day.

The Chestnut Street Bridge should be painted throughout and the western approach be raised to the grade level. It is to be hoped that the embankment forming this roadway will have now reached a sustaining point in the marsh on which it was made. The want of regularity in this roadway and footway detracts much from its appearance.

The Penrose Ferry Bridge is again in ruins, having had its northern draw pier destroyed by the almost unprecedented freshet in the Schuylkill river, which occurred on October 4th, last. The draw and the approaches are still standing and in good condition, but the long span (200 feet) and its outer pier are gone. Measures will be taken at once for its reconstruction, as Councils provided for it in the appropriations for the current year.

The value of the records made in the Registry Bureau, are being more and more appreciated as it becomes better understood, and the only want we perceive in the system as originally designed, is, that of an index for early and rapid reference, so that property may be found by the *name of owner* as easily as we find the name of owner from the property. The use of our books to verify ownership in matters of security, whether offered for official incumbents, or as bail at Court, is not so generally adopted as we believe it should be;

for any questionable assertion as to ownership could be verified in a very short time by a certificate from this department; and if the property owned and submitted is not registered, it should be.

We have now received and filed in the Bureau, 127,893 descriptions of property, of which 10,890 were filed the last half year of 1865; 29,110 in 1866; 54,537 in 1867; 17,584 in 1868, and 15,935 during 1869. Of these 82,716 are plotted in atlas. To show that the law is being carried out with greater attention, we have during 1869, 8,450 transfers of property filed, or nearly double the number returned in the three and a-half years preceding. Of the 45,117 descriptions not plotted, it is proper to say that the larger proportion of them are in the rural wards.

The further improvement of Broad street has been retarded on account of the construction of the sewer between Somerset and Ontario streets, but will so soon as spring permits, be continued so as to reach Germantown avenue the present year.

There has so far been expended by the City on Broad street, $75,700 95, as follows:

On graduation, - - - - - -	$26,627 50
On curbing, paving and macadamizing, -	12,823 23
	$39,450 73

Above Germantown avenue to Fisher's lane, the graduation and bridging has cost $35,250 25.

The construction of the bridge over the Reading Railroad, now authorized by Councils, will open this street as a desirable thoroughfare to Fisher's lane.

It is a matter of regret that the further improvement of the carriage-way of Broad street has been entirely suspended, owing to the decision of the Supreme Court in the matter of the Nicholson pavement laid between Coates street and Columbia avenue; upon this contract there is yet unpaid $ held by the contractors in assessment bills against the property fronting on the paving. The contract under which this work was done extended southward to Willow street, but as soon as the views of the Court were known, all work was suspended.

I feel assured that this street could be made a most attractive avenue by the improvement of its carriage-way, and that the City would be more than repaid by the increase in the assessed value of property upon its line.

By authority of an ordinance of Councils, this department has now under examination the matter of improving the carriage-way of Market street; the survey is completed, and the examination made shows that there is no difficulty in proceeding with the work of that part lying east of Eighth street, so soon as the necessary authority shall be given by Councils. Westward of Eighth street no acceptable plan can be devised until it is decided what can be done with the freight railroad now occupying the middle of it.

As relates to the eastern section, it is proposed that the footway be made uniformly nineteen feet wide instead of sixteen feet, as now, between Eighth and Third streets, and fifteen feet eastward of Third street. This will give a carriage-way of sixty-two feet, or the same as it now is westward of Eighth street. The increase of three feet to the footway to Third street, and of four feet eastward, will be of great advantage in affording greater facilities for business. An adjustment of the passenger railway tracks will be necessary, but I feel assured that the Company will give all assistance to so valuable an improvement.

The cost of this work, with a proper pavement for the carriage-way, will be approximately $75,000; as to the character of the paving for this street, as it is intended exclusively for heavy business traffic, it is suggested that it be granite block, laid under close specification, and a *still closer inspection.*

In a report submitted by myself to Councils upon the subject of carriage-way paving, of date February 20th, 1868 (see p. 464, vol. 1, Journal C. C.), the relative applicability of stone and wooden pavements was alluded to, and so far nothing has occurred to cause a change in those views; what is wanted with us is a proper inspection of work during construction; the drawing of specifications and appending them to contracts executed, is a mere matter of form, as the contractor is practically his own inspector, and until such inspection is provided, our street paving, let it be of whatever character specified, cannot meet the requirements.

In paving, much work has been done by and under individual authority, particularly in cubical blocks. The propriety of this I very much question, as under such arrangements no regard whatever is paid to the specification for such work that Councils have adopted for the government of their officers. And the remark with reference to sewers will be applicable here, *i. e.*, that all work of public character should be made under the immediate charge and supervision of the department entrusted with that particular duty. The material for paving and the best method of its application is a subject of great moment for the consideration of Councils; the roughness of the cobble-stone, its want of cleanliness, with the difficulty of having it properly laid, as it is probably the most difficult pavement to lay well, and but few who have not examined the matter can estimate what effect a change of paving on our 326 miles of paved streets would have, and as items in this estimate, I would suggest, the increase of life for horses (therefore their enhanced value), the decreased cost of shoes, the increased load they could transport within the same limit of time without greater exertion (thus facilitating business), the reduction of wear and tear on vehicles (thus increasing their durability and the increased comfort not only to those using the streets, but to those residing upon them). These items reduced to dollars and cents will, in the magnitude of the amount, be surprising.

The horse-paths of our passenger railroads show a most objectionable feature of the cobble pavement, as from its constant use the stones become so slippery that it is a matter of difficulty for the horses to keep their upright position. It is surprising that the injury thus suffered by the horses of the Companies has not suggested the importance of experimenting with surface more fitted to their use.

The business of the department has been increasing each year since its organization, but for the past two years the additional duties imposed upon the head of the department, as a member of the Fairmount Park Commission, the Commission for Erecting Public Buildings, and as Engineer of the South Street Bridge Commission, have necessarily encroached upon the time usually devoted to the specific duties of the department, and it has therefore been impossible to attend to more than the generalities, leaving the details and

the direct personal supervision of works under construction (such as the main sewers now building under Ordinance April 24th, 1868) to the draftsman of the department, who, fortunately for us all, is an experienced civil engineer.

The duties of this officer, strictly speaking, lie at the department, and consist in the preparation of such plans and designs as may be necessary, under the direction of the Chief Engineer and Surveyor, but owing to the circumstances detailed preventing the personal attention of the head of the department to the construction works, other and more responsible duties have been delegated to the draftsman, and I have had to draw upon the force engaged in the Registry Bureau for a draftsman in the office, so that the current business may be transacted.

Those familiar with the department are perfectly aware that a large portion of the time of the Chief Engineer and Surveyor, during ordinary office hours, is consumed in explanations and answers to those seeking information in matters pertaining to the department, and that his prolonged or continued absence from the office would result in delay and at times to great inconvenience.

Was there an Assistant Engineer authorized for this department, with a salary proportionate to his responsibilities and the experience he must bring to successfully perform his duties, the department would be relieved of a great burden.

Respectfully submitted.

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

Filton

ANNUAL REPORT

OF THE

Chief Engineer and Surveyor.

P-3

FOR THE YEAR 1873.

PHILADELPHIA:
E. C. MARKLEY & SON, PRINTERS, 422 LIBRARY STREET.
OPPOSITE POST OFFICE.
1874.

ANNUAL REPORT OF THE CHIEF ENGINEER AND SURVEYOR.

PHILADELPHIA, *April* 20, 1874.

Hon. WM. S. STOKLEY,

Mayor of Philadelphia.

DEAR SIR:—In compliance with your official request, I respectfully submit the following account of moneys received and disbursed, and statement of the business of this department for the year 1873.

The amount of general appropriation to the department for the year 1873, approved December 23, 1872. $107,550 50

Expended as follows:

Salaries and expenses of general office and Registry Bureau,		$21,750 00	
Salaries thirteen District Surveyors,		6,250 00	
New surveys, revisions and landmarks,		18,332 50	
Surveys for Registry Bureau,		2,000 00	
Examinations of sewers and preparing liens,		3,665 00	
Plans of wharves and landings belonging to the City,		500 00	
Bridges over the Reading Railroad at Fifth street,		12,130 52	
Unexpended balances—			
For bridges over Reading Railroad,	$34,685 48		
Work ordered and not completed,	8,237 00	42,922 48	
		$107,550 50	$107,550 50

Special Appropriations.

June 2, 1873,	5,000 00
June 30, 1873, out of Sewer Loan, Oct. 14, 1872,	401,000 00
November 29, 1873,	25,000 00
Balance of January 23, 1872, Cohocksink, Mill Creek, and Federal street sewers,	27,589 92
	$458,589 92

Amount of special appropriation expended.			
Appropriation of January 23, 1872,		$12,560 10	
Appropriation of June 30 and November 29, 1873, Main sewers,		31,208 00	
Unexpended balances of special appropriations.			
Appropriation of Jan. 23, '72,	$15,027 82		
" June 30th and Nov. 29, 1873,	394,792 00		
Appropriation of June 2, '73,	5,000 00	414,819 82	
		$458,589 92	$458,589 92

The receipts, as deposited with the City Treasurer, have been as follows:

For sewer permits from March 1st (ten months),	$4,109 00
For blank deeds of dedication,	16 25
For Registry Bureau certificates,	122 85
	$4,248 10

Surveys for the extension of the City plan have been made in the Twenty-sixth, Twenty-first, Twenty-second, and Twenty-third Wards, and plans covering 2,148 acres have been filed in the office.

The following plans of revision have also been filed: Curb lines of Broad street, from Vine to South street; Adams street, from Rittenhouse to Harvey street, Twenty-second Ward; Passyunk avenue, from Eighteenth to Twenty-fifth street, Twenty-sixth Ward; Mantua avenue and Thirty-second street, Twenty-fourth Ward; Rittenhouse street, Twenty-second Ward; Mt. Pleasant street, Germantown avenue to Mower street, Twenty-second Ward; Dock street, Walnut street to Delaware river, Fifth Ward; Ontario street, Tulip street to Trenton avenue, Twenty-fifth Ward; Main street, from Washington street to Preston's mill, Twenty-first Ward; Mitchell street, from Green lane to Kram's avenue, Twenty-first Ward; Fiftieth and Aspen streets, Twenty-fourth Ward; Manayunk avenue, Green lane to Riley street, Twenty-first Ward; Rubicam street, Wister street to Wisteria avenue, Twenty-second Ward; Sixteenth and Clearfield streets, Twenty-eighth Ward; Church street, Hamilton to Wood street, Twenty-first Ward; showing an increase in the number of revisions asked for.

The confusion attending such alterations is so great, that it is frequently better to tolerate some disadvantages; many applications are rejected and no plans are approved without cogent reasons therefor.

Where improvements have progressed in the suburban districts without proper regulations, it is almost impossible to carry out

any specific plan. In Manayunk, which is crowded between the hills and the river, there is such a conflict of interest and diversity of opinion, and applications for revision have been so numerous, that a thorough examination is now being made, with the intent of effecting the best practicable adjustment of the difficulty, and adhering to it in the future. In other sections, great variations occur in the surroundings and conditions of the territory, so that the old streets are quite unsuited for the business now adapted to the locality. This is particularly the case along the lines of steam railroads where revisions have been made, not only on this account, but for safety to travel, which can only be secured by dispensing with grade crossings at all City streets.

On account of the industrial interests which have grown up in connection therewith, this can only be accomplished on the line of old established railroads at such an enormous cost as to render the undertaking almost impracticable; but the evil should not be increased by the building of new roads without regard to City streets. It is of the utmost importance in this age of rapid transit, to be able to carry passengers to the great centres of population, without danger and delay incident to crossing streets at grade. If, in the rural sections, where streets are put on the plans but not opened on the ground, their position and grades were properly considered in connection with the location of the railroads in advance of their construction, a great saving would be effected, and the interests, both of the City and the companies, would be promoted. An instance has recently occurred in the Twenty-second Ward, where part of a plan just completed has been rendered impracticable by the construction of a road without any examination of the City lines and grades. So many variations have been made in the rectangular system of streets, that the City has lost much of its primitive regularity; but there has not been sufficient attention given to providing diagonal avenues, which invariably become thoroughfares of great importance. Some of the old roads now obliterated might have been retained with great advantage.

By an Act of Assembly and ordinance of Councils, one of these, Nicetown lane, has been placed on the plan, and in connection therewith, a street is now being laid out of the width of one hundred feet, which will make a diagonal drive from Thirty-third street and Ridge avenue to Broad street, which will be a great convenience to the northern section of the City, and a direct communication from Fairmount Park to Hunting Park.

Similar avenues should be laid out in other parts of the City, and some already existing should be extended and widened be-

fore new buildings are erected, which will increase the cost. One of these in particular, Girard avenue, should be extended from Aramingo canal to the intersection of Cumberland and Richmond streets. The bridge at Richmond street and the Reading Railroad, is now being built, and should Girard avenue be opened through the College grounds, this arterial avenue will extend, without obstruction, from Bridesburg to Hestonville. The connection between the streets of the Twenty-fifth and Twenty-third Wards is so imperfect, that an avenue should be laid out near the little Tacony creek in Frankford, which will give direct access to the centre of the City, and make better provision for drainage. If such streets as Ridge, Passyunk, or Germantown avenues had been widened in advance of improvements, a trifling outlay would have given them a capacity commensurate with their crowded condition, and a character which would have enhanced the value of property along the line.

Regard for future requirements demands that a number of leading thoroughfares should be wider where their improved condition would fully compensate for all losses sustained by lot holders fronting thereon. But under the present jury system this cannot be accomplished without a heavy drain on the City Treasury. Individuals obtain the most extravagant testimony as to values, while no one cares to subject himself to ill feeling by testifying in favor of the City. A majority of jurymen have little or no knowledge of real estate operations, or the effect of improving our thoroughfares, or are influenced by perverted testimony, so that by their awards a great and unjust burthen is placed on the City. Instances of this kind are constantly occurring; a recent one being that of Haverford, between Forty-second and Fifty-seventh streets, which was an old road fifty feet in width increased to eighty feet. The street was paved and immediately the properties fronting thereon increased in value, at a very low estimate, $300,000. Notwithstanding which, damages against the City were awarded by a jury to the same owners for $47,000. Some system should be devised by which awards should be made by men experienced in real estate transactions, or who can appreciate the effect of converting streets into popular avenues, so that a line of justice can be drawn between the City and property owner; otherwise there is no security to the public, or encouragement to develop the streets as they should be in a City of this magnitude.

The proceedings by which the streets become the property of the public, are various; where they are opened by jury or dedicated, a record is made in this office; but many streets have been

created by division of estates and the laying out of suburban villages, of which no record can be made, unless the public right is established; in many cases this is gained by twenty-one years' use. Before making any municipal improvements, the ordinance of Councils require that the Chief Engineer and Surveyor shall certify to their dedication or opening. Evidence of this kind is so limited, that in many instances, it is impossible to furnish such certificate, although the City may have had charge of the streets for many years. It would be well to have a general examination into the rights of the City instituted, so as to increase the scope of these records and to perfect them as far as practicable.

The following is a list of streets placed on the City Plans during the year, under resolutions of Councils; they are generally accompanied with deeds of dedication:

Merideth street, Twenty-fourth to Twenty-fifth street, Fifteenth Ward; Lex street, Transcript to Huron street, Twenty-fourth Ward; Clarion street, Jackson to Wolf street, First Ward; Juniper street, Jackson to Wolf street, First Ward; McClellan street, Eighth to Ninth street, First Ward; Natrona street, Connecting Railway to Montgomery street, Twenty-ninth Ward; Hollingee street, Thomazine to Columbia avenue, Twenty-ninth Ward; Anna street, Natrona to Thirty-first street, Twenty-ninth Ward; Hollingsworth street, Natrona to Thirty-first street, Twenty-ninth Ward; Maud street, Thirtieth to Thirty-third street, Twenty-ninth Ward; Giles street, Natrona to Thirty-second street, Twenty-ninth Ward; Guest street, Natrona to Thirty-second street, Twenty-ninth Ward, Thomazine street, Hollingee to Thirty-third street, Twenty-ninth Ward; Arrott street, Leiper to Adams street, Twenty-third Ward; Ringgold street, Montgomery to Berks street, Twenty-eighth Ward; Taylor street, Montgomery to Berks street, Twenty-eighth Ward; Bucknell street, Berks to Norris street, Twenty-eighth Ward; Judson street, Berks to Norris street, Twenty-eighth Ward; Emma street, Otis to Abigail street, Nineteenth Ward; Bright street, Wayne to William street, Nineteenth Ward; Lark street, Wayne to William street, Nineteenth Ward; Willow Grove avenue, Springfield avenue to Thirty-third street, Twenty-second Ward; Latona street, Thirtieth to Thirty-first street, Twenty-sixth Ward; Mt. Holly street, Reed to Dickinson street, Twenty-sixth Ward; Garnet street, Reading Railroad to Hart street, Twenty-fifth Ward; Winchester street, Ripka to Jefferson street, Twenty-first Ward; Charles street, Manayunk avenue to Ridge avenue, Twenty-first Ward; Adrian street, Adams to Ridge avenue,

Twenty-first Ward; Mechan avenue, Germantown avenue to Chew street, Twenty-second Ward.

The drainage and sewage of the City has been greatly improved by the construction of branch sewers in various sections, 69,800 feet having been built during the year, at a cost of $180,696.26, of which $27,866.12 has been paid by the City, and $152,830.14 by the property owners, on an assessment of $1.50 per foot of front. Most of these are circular, three feet in diameter; the following being a statement of their location.

STATEMENT.

LOCATION.	Length.	Assessment Bills.	Cost to City.	Total Cost.
Haverford street, between Thirty-seventh and Thirty-eighth streets	415	$1,057 53		$1,057 50
Spring Garden St., between Osprey & Linville Sts	152	168 00	385 20	553 20
Franklin street, between Green & Coates streets	696	1,604 73	633 27	2,238 00
Fitzwater street, between Ninth & Russell, and on Russell St., bet. Bainbridge & Fitzwater Sts	476	1,011 25	231 15	1,242 40
Baker street, between Mulberry & Oak streets	216	494 70	416 0	910 75
Thirty-fourth St., between Bridge & Filbert Sts	1,502	2,874 50	740 08	3 614 58
Nineteenth & Howell Sts., between Nineteenth & Pine and Twentieth & Howell streets	730	1,559 65	503 70	2 062 75
Girard avenue, between Tenth & Eleventh Sts	463	891 49	341 56	1,232 05
Arch street, between Eighth & Ninth streets	445	1,188 00		1,188 00
Forty-second St., bet. Haverford & Eadline Sts	572	1,367 14		1,241 20
Twenty-ninth St., between Pennsylvania Av. & Poplar; on Poplar St., between Twenty-eighth & Twenty-ninth; and on Twenty-eighth street, between Poplar & Golbeck streets	2,052	4,127 30	1,766 70	5,894 00
Wharton street, between Sixth & Seventh streets	140	366 00	14 00	380 00
Seventh street, between Federal & Reed streets	486	1,060 39	209 61	1,270 00
Twenty-second & Fairfield streets, between Filbert & Twenty-first streets	565	1,301 00	70 25	1,371 25
Barley street, between Tenth & Eleventh streets	446	1,101 00		1,953 50
Thirteenth street, between Wallace & Melon Sts	1,005	1,460 01		1,438 90
Columbia Av. & Park Av., between Park Av. & Thirteenth street	479	890 00	287 75	1,177 75
Thirty-second St., between Lancaster Av., and N. of Race street	1,519	3,334 00	666 30	4,000 75
Seventeenth street, between Columbia avenue & Montgomery avenue	580	1,283 35	71 65	1,355 00
Fifth & Race streets, between Fifth & Crown Sts	935	2,407 52		2,253 75
York street, between Tenth & Eleventh streets	513	919 05	428 16	1347 21
Second St., between Coombs alley & Church St	287	729 44	114 16	843 60
Ontario St., between Poplar & Heath Sts	215	467 48	78 52	546 00
Powelton Av., bet. Thirty-ninth & Fortieth Sts	582	1,125 33	99 77	1,225 10
Elm, Story, & Union Sts. between Thirty-ninth & Fortieth streets	2 264	4,478 91	722 17	5,201 08
Seventeenth St., between Brown & Valeria Sts	194	406 19	60 62	466 80
Hamilton St., bet. Thirty fourth & Thirty-fifth Sts	373	967 50		865 52
Camac street, between Jefferson & Oxford streets	563	1,326 80		1 212 30
Tenth street, between South & Christian streets	1,319	3,375 71		3,012 23
Germantown avenue, between Chelton avenue & Rittenhouse street	605	1,433 66	279 84	1,713 50
Fernon street, between Eighth & Ninth streets	317	964 50		927 50
Philip street, between Master & Oxford streets	195	403 74	196 68	600 42
Letterly St., bet. Kensington Av. & Jasper St	216	545 50	120 90	666 40
Twenty-third St., bet. Jefferson & Oxford Sts	518	1,117 48		1,071 00
Twentieth St., bet. Master & N. of Oxford St	842	2,070 42		1,820 04
Fifth street, between Walnut & Chestnut Sts	338	735 41	136 56	871 97
Norris St., bet. Eighteenth & Twenty-first Sts	1,435	3,114 76	278 09	3 392 85
Allegheny Av., bet. Broad & Seventeenth Sts	946	1,999 25	568 19	2,567 44
Catharine St., between Passyunk Av. & Sixth St.	144	152 50	279 10	431 60
Bache street, between Race & Vine streets	190	400 50	172 00	572 50
Forty-first St., between Spruce & Walnut Sts	412	771 36	563 84	1,335 20
Norris St., between Sixteenth & Eighteenth Sts	901	2,041 49		2,041 49
Hillsdale street, between Third & Fourth streets	220	480 38	614 62	1,095 00
Pine street, across at Wren street	47		125 45	125 45
Bridge St., between Lancaster Av. & Sloan St	250	491 73	86 27	578 00
Brown St., between Seventeenth & Francis, and on Francis St., between Brown & Eighteenth Sts	589	1,266 04		1,172 00
Forty-fifth street, across Lombard street	107		296 75	296 75
Christian St., between Twenty second & Twenty-third streets	500	1,019 98	50 02	1,070 00
Howell street, between Thirty-third & Thirty-fourth streets	352	902 87		791 80

STATEMENT—Continued.

LOCATION.	Length	Assessment Bills.	Cost to City.	Total Cost.
Fourth street, between Callowhill & Wood Sts.....	856	$803 00	$252 44	$1,055 44
Powelton Av., bet. Thirty-eighth & Thirty-ninth streets.....	726	1,608 57	.....	1,604 80
Chestnut St., bet. Thirty-fourth & Thirty-fifth Sts	402	975 00	100 68	1,075 68
Fifteenth street, between Coates & Swain streets..	628	1,355 61	36 79	1,392 40
West street, between Brown & Parrish streets.....	426	916 25	119 85	1,036 10
Park Av., bet. Columbia Av. & Jefferson street....	846	2,246 99	.....	3,879 50
Girard Av., bet. Corinthian Av. & Twentieth St...	415	893 89	.....	865 00
Oxford St., bet. Twentieth & Twenty-first Sts.....	533	1,208 74	.....	1,154 30
Greenway Av., bet. Seventy-first & Seventy-second streets.....	97	.....	434 00	434 00
Walnut St., bet. Forty first & Forty-second Sts...	361	930 00	53 35	983 35
Chestnut St., bet. Thirty-third & Thirty-fourth Sts	535	1,435 94	.....	1,265 50
Seventeenth St., bet. Walnut & Sansom, and on Sansom street to near Sixteenth street.....	545	1,150 92	291 58	1,442 50
Franklin street, between Willow & Wood streets..	508	1,120 92	269 08	1,390 00
Callowhill St., bet. Franklin & Eighth streets.....	305	669 46	124 24	793 70
North St., bet. Eighteenth & Nineteenth Sts.....	434	1,004 91	15 55	1,020 46
Jasper St., bet. Lehigh Av. & Huntingdon St.....	658	1,311 32	166 80	1,478 12
Carlton St., bet. Thirteenth & Broad Sts.....	612	1,401 03	820 97	2,222 00
Jefferson St., bet. America & Mascher Sts.....	835	1,676 88	248 42	1,925 30
Catharine St., bet. Second & Third Sts.....	565	1,380 59	347 91	1,728 50
Elmwood Av., across at Fifty-seventh St.....	82	.....	279 50	279 50
Fifth St., between Girard Av. & Thompson St	473	1,210 22	.....	1,157 90
Ridge and N. College Av., northward from Master street.....	635	1 458 14	.....	1,367 75
Lemon St., between Tenth & Eleventh Sts.....	385	950 20	84 50	1,034 80
Twenty-third St., bet Virginia & Coates, and on Virginia St, bet. Twenty-third & Twenty-second streets.....	490	1,047 07	393 03	1,440 10
Bond street, between Ninth & Tenth streets.....	331	888 00	68 80	956 80
Sixteenth street, between Race & Summer streets, thence to Vine street.....	661	1,327 55	260 75	1,588 30
Woodlands St., bet. Thirty-second & Thirty-third streets.....	675	1 643 59	.....	1,556 00
Eighteenth St., bet. Federal & Washington Sts.....	740	1,237 75	524 25	1,762 00
Third street, between Callowhill & Vine streets...	565	1 679 12	19 38	1,698 50
Girard avenue, between Mascher & Second Sts.....	500	1,021 24	553 76	1,575 00
Marshall street, bet. Girard Av. & Poplar St.....	975	2,675 41	349 59	3,025 00
Kurtz " " "	621	1,555 26	146 14	1,701 40
Thirteenth " " Haines St.....	635	1,345 98	194 52	1,540 50
Eleventh St., bet. Columbia Av. & Oxford St.....	450	1,263 00	.....	1,052 50
Lerering & Crosson streets, Twenty-first Ward...	614	1,052 07	1,910 93	2,963 00
Hamilton & Thirty-third streets, between Baring & Thirty-fourth streets.....	616	1,446 98	.....	1,441 72
Forty first St., between Spruce & Pine Sts.....	420	660 00	472 80	1,132 80
Woodlands St., between Thirty-seventh & Thirty-ninth streets.....	570	1,107 54	231 26	1,338 80
Nineteenth St., bet. Federal & Bainbridge, and on Bainbridge to Twentieth street.....	3,000	6,216 92	2,653 08	8,869 00
Girard Av. bet. Montgomery Av. & Eyre St	234	232 53	519 47	752 00
Powelton Av., bet. Thirty-sixth & Thirty-seventh streets.....	300	794 99	.....	690 00
Rodine St., bet. Jefferson & Oxford Sts.....	347	705 00	125 75	830 75
Noble St, bet. Tenth & Canton Sts.....	350	645 56	361 94	1,007 50
Carlton St., bet. Nineteenth & Twentieth Sts.....	220	500 12	259 88	760 00
Eleventh St., bet. Wallace & Melon Sts.....	304	680 30	153 62	833 92
Irving St., bet. Thirty eighth & Thirty-ninth Sts.	391	1,013 98	.....	889 29
Uber St., between Norris & Berks Sts.....	545	1,343 00	.....	1,236 30
Thirty-ninth St., bet Powelton Av. & Market St..	874	1,966 96	46 10	2,013 06
Warren St., bet. Thirty-fifth & Thirty-sixth Sts...	285	676 63	85 12	761 75
Sixteenth St., bet. Chestnut & Sansom Sts.....	247	515 00	167 20	682 20
Third St., bet. Cherry & Race Sts.....	285	825 42	31 08	856 50

STATEMENT—Continued.

LOCATION.	Length	Assessment Bills.	Cost to City.	Total Cost.
Lancaster Av., bet. Thirty-sixth & Thirty-seventh streets	290	600 00	67 20	667 20
Fifth St., bet. Washington Av. & Wharton St.	930	2,117 12	364 88	2,482 00
Vine & Perry Sts., bet. Thirteenth & Lambert Sts.	570	1,283 63	346 87	1,630 50
Nicholas St., bet. Twentieth & Twenty-first Sts.	528	1,310 15	.....	1,168 20
Twenty-second St., bet. Jefferson & Oxford Sts.	502	1,194 00	.....	1,179 50
Union St., bet. Silverton Av. & Elm St.	417	945 00	3 23	948 23
Wallace St., bet. Seventh & Franklin Sts.	285	627 49	190 66	818 15
Twentieth St., bet. Brown & Poplar Sts.	822	2,140 00	.....	2,085 40
Mervine St., bet. Columbia Av. & Oxford St.	380	1,032 00	526 60	1,558 60
Bedner St., bet. Twenty-second & Twenty-third streets	444	1,100 00	.....	1,091 20
Allegheny Av., bet. Sixteenth & Nineteenth Sts.	1,337	2,665 84	826 22	3,492 06
Union St., bet. Third & Fourth Sts.	305	833 33	.....	766 75
Juniper St., bet. Race & Vine Sts.	457	1,163 84	32 96	1,196 80
Spring St., bet. Fifteenth & Sixteenth Sts.	451	947 68	269 82	1,217 50
Fifth & Cherry Sts., bet. Arch & Sixth Sts.	815	1,716 07	460 69	2,176 75
Coral St., bet. Otis & Moore Sts.	405	945 08	137 42	1,082 50
Ellsworth St., bet. Passyunk Av. & Ninth St.	380	816 89	229 31	1,046 20
Fourth St., South to Trout & Trout to Barrow St.	416	1,039 58	496 42	1,536 00
Davis St., bet. Wistar's land & Thirteenth St.	265	668 00	.....	655 35
Twenty-second & W. Delancey Sts., bet. Twenty-first & Spruce Sts.	722	1,425 25	840 75	2,266 00
Seventh St., bet. Green & Coates Sts.	570	1,453 09	93 91	1,552 00
	Feet. 69,300	$152,880 14	$27,866 12	$180,696 27

The surface drainage, particulary in the southern section of the City, is rendered imperfect by the manner of paving the streets. Where the gradients are very light, the camber and gutter dimensions should be arranged with great care, to carry off the surface water and give sufficient gutter capacity. Under present arrangements, this is left to the fancy of the contractor, who knows nothing of the requirements of the case. Slight obstructions fill the gutters, and not from any want of capacity or defect in the construction of the sewers or inlets, but from this cause, the streets are frequently flooded with water during heavy rains. The foundation of the paving being deficient in gravel, the accumulated water softens the surface so that some streets are plowed into ruts by passing vehicles and rendered almost impassable. The measurement of quantity is made by the District Surveyors, but they have no control over the character of the work.

The important subject of street paving has claimed the attention of Councils at various times, and a carefully written report, prepared by Mr. Kneass, was presented to Councils on the twenty-ninth of April, 1868, by a joint special committee of those bodies, who submitted an ordinance for their consideration, upon which also they had secured the endorsement of a committee of engineers appointed by the Franklin Institute. This ordinance (see Common Council Appendix 1868, page 477), provided for the appointment of a superintendent of paving, whose duty it shall be to superintend, direct, and inspect, during the prosecution of the work, all paving, &c., and shall approve no work unless completed strictly in accordance with the specifications therefor drawn by the Chief Engineer and Surveyor. If such a plan were adopted, some control could be exercised over the shaping, elevation, and construction of roadways, by which great improvement could be made in surface drainage, as well as in the durability and condition of the roadway.

There are several localities which have for years been subject to overflow at every heavy rain; several of these are at points distant from the river outlets, where the intervening ground is higher than the territory which becomes flooded. At Front and Harrison streets there is a dish from three to six feet lower than the intersection of any of the adjoining blocks, and the same condition of affairs exists at Tenth and South streets. The regulation and sewage of these points were fixed in the first laying out and building of those portions of the City, so that any change in the elevations would be attended with heavy cost. For the relief of these and other places, where like difficulties occur, this Department has reported a system of main sewers, which will remedy the evil. There is urgent necessity that some means

should be adopted to provide the money required to carry them into effect. All sewers constructed in this Department since consolidation, have been proportioned to carry off one inch of rainfall in each hour.

Owing to the enormous cost of constructing main sewers of great size and length, such as Hart creek sewer, which will extend from Aramingo canal to Twenty second and Tioga streets, a distance of four miles, short sections only have been built where most needed, but in all cases they are made of such elevation and capacity as to become part of a system which is being carried out where the main sewers are authorized.

The amount of rain-fall taken for the maximum, is as great as is provided for in other American cities, where a system has been introduced.

In the City of Brooklyn where the annual rain-fall averages nearly the same as this City, and where a system of sewage has been in successful operation for a number of years, the engineer has taken "the rain-fall entering the sewers from the street as equivalent to one-half inch per hour, from the roofs of houses as equal to two-thirds of an inch per hour; the back yards as equal to one quarter inch per hour," equal to a total of only one-half inch of rain-fall to be provided for in sewers. The records of the Pennsylvania Hospital exhibit a fall of 7.3 inches between the hours of 4 P. M. on the 12th, and 7 A. M. on the 13th of August last, an average of a half-inch per hour. As the fall was very constant it is not probable that the rate at any time amounted to one inch per hour. The accumulation during a very heavy rain on the 1st of January, 1873, was .96 of an inch in one-and-a-half hour. Mr. Kirkwood in Brooklyn reports, remarks that a rain-fall of one inch occurs but rarely, and experiments show that of the rain falling during a heavy storm in one hour, not more than one-half of its amount, rarely as much as one-third, finds its way into the sewers within one hour. Its progress from the roofs of houses to the leaders and drains, and from the surfaces of the streets to the gutters at their corners, consumes necessarily a certain amount of time, so that the water will always be found flowing in the streets for a certain time after the rain has ceased to flow.

It would therefore appear from statistics of rain-fall here, and the experience of other cities, that the maximum adopted in proportioning the dimensions of sewers is ample, and considering the great cost of such improvements, it is not true economy to construct such as are authorized of greater capacity than is absolutely required, while the funds are needed for relief of many places suffering from the accumulation of water and dampness seriously affecting the health of the residents.

The utilization and disposition of town sewage has claimed a great deal of attention in Europe within the last few years, on account of the pollution of streams of water where the population has become dense. Many costly experiments have been tried in England and elsewhere to remedy the evil, but even those processes which have the strongest advocates are open to serious objections, and some which in theory gave great promise have not stood a practical test and have been abandoned. The wastefulness of the water closet system in discharging into rivers such a valuable fertilizer as the excrement of the population of large cities must in time be apparent. The removal of the sewage from residences is a prime necessity, but the work is imperfectly accomplished when the discharge is made at the City front, where large accumulations of decomposing animal and vegetable matter might prove pestilential. This system is growing rapidly in this City every year, 981 permits having been issued for water closet connections since the 1st of January. With such large rivers as the Delaware and Schuylkill no great inconvenience is yet experienced within the tidal range, but so soon as a practical method of utilization is discovered it should be adopted. In European cities they are under the necessity of applying a remedy even at heavy cost, and profiting by their experience, a system can before long be introduced here which will not be merely an expensive experiment.

There are great defects in many of the old sewers which were originally intended merely for surface drainage, so that they are not adapted to the modern requirements for water closets. Their outlets being of insufficient depth, they are too shallow throughout their entire length to afford the house drainage which is now demanded.

The Board of Surveyors are frequently urged to grant extensions to these sewers, where the same difficulty will occur in the new. And in some cases the demand is so pressing that branch sewers are authorized where no deeper discharge can be secured, and the evil is thereby increased and entailed on the future.

Surveys of the depth and location of old sewers are now being prosecuted, and in some localities the difficulty can be remedied.

The main sewer on Market street, between Fourth and Juniper streets, which was contracted for on the 24th of September, will relieve a large section which was subject to this objection. The diameter is five feet from Fourth to Eighth street, the depth below the pavement at the latter point being fifteen feet; this will allow of the reconstruction of a number of laterals. The work, at the close of the year, had progressed as far as Eighth street.

The Federal street sewer, extending from the Schuylkill river to Eighteenth street, seven and a half feet diameter at its outlet, gradually reducing to three feet at Eighteenth street, was completed in June; the total length is 5,773 feet, and the cost thereof $67,485.

Work was commenced on the Clearfield street sewer in May last; it is sixteen feet in diameter, extending from Fifth to Sixth streets, and is a section of the Hart creek sewer; one hundred and fifty feet remained to be completed on the first of January. The stream has been diverted from the adjoining meadow, so that the high embankment by which Fifth street is carried over the Reading Railroad can now be completed.

The contract for extending the Moore street sewer was awarded at the same time; on the marshes east of Swanson street it is supported on timber platform and piling, and is still in the hands of the contractor.

The overcharged sewer at Eighteenth and Vine streets has been entirely relieved by the construction of the main sewer on Wood street, from Seventeenth to Twenty-first streets.

The Mantua creek sewer is nearly completed south of the Pennsylvania Railroad, and the excavations are being made along the tow path and under the canal at Fairmount locks; this portion of the work will be completed before the opening of navigation, affording an outlet for drainage below the dam; so that the foul stream which has been emptying its contents into the pool at Fairmount, will be diverted before the hot weather sets in.

The sewer which was contracted for in 1871 to cross the Darby road at Mill creek, has not been finished; the delay has been occasioned by the street not having been legally opened the required width; until the award is confirmed, no work can be done, notwithstanding the filling up and paving of the avenue is kept back and cannot be done until the sewer is constructed. Other main sewers for which a loan has been created, viz.: Hart creek, West Cohocksink, and Thirtieth street sewers, have not been built for the same reason, that streets have not yet been legally opened.

The meadow drain in the First and Twenty-sixth Wards was completed during the year. The bottom of the drain was dredged to the depth of ten feet below high tide, and shaped so as to give a width of eighteen feet in the bottom and forty feet at the top. It terminates at Twentieth street, near Moyamensing avenue, and extends eastward along Curtin street, Thirteenth street, Geary street, Fifth street, Avenue Thirty-six, and Swanson street to the meadow bank, and from thence to the outlet on the Dela-

ware river near the east end of League Island. The total length of the main ditch is 16,434 feet; in addititon to this, branches extend northward on Fifth and Thirteenth streets, making an additional length of 5,750 feet; seven farm bridges were built for the accommodation of farmers whose land was cut up; also, a bridge at Broad street 56 feet long, and two bridges at the crossing of the Delaware extension of the Pennsylvania Railroad. The main sluice, which was damaged by force of the tides, has been reconstructed in a most substantial manner; and small sluices are made in the banks wherever required. The work was accepted from the contractor nearly a year ago, since which time it has not received any attention. It is impossible for the drain to answer the purpose for which it was made, unless it receives supervision; sluices require frequent inspection, musk-rat holes should be filled up, and breaks repaired promptly wherever they occur; the banks are liable to settle and slide, so that the water may overflow and cause great destruction at any time.

Two miles of the Kingsessing meadow banks have been reconstructed, according to the specifications, during the year, leaving one mile yet to be completed.

The Port Wardens' lines have been extended from Greenwich Point to League Island, and from League Island to Penrose Ferry Bridge on the Schuylkill. They have already been established between Fairmount Dam and South street. It is important that this work should be extended to Penrose Ferry at an early day, as new wharves are required to accommodate the increasing commerce of the Schuylkill.

Work has progressed on three river bridges.

Girard avenue bridge crosses the river Schuylkill on the site of the old wooden bridge, and is exactly on the line of Girard avenue west of the river, its length being 1,000 feet, and its width 100 feet.

The contract with Clark, Reeves & Co., for its construction and erection, was signed on the 22d of January, 1873, and the time fixed for its completion was the 22d of September, 1874, twenty months from that date.

The temporary bridge, to accommodate the general traffic and driving through Fairmount Park, was constructed 100 feet north of the bridge site, and opened to travel on the 8th of May, and the old bridge was immediately removed, and, at the close of the year, the stone abutments are prepared for the iron superstructure, one-half of which is in position.

The bridge consists of five spans; three of 197 feet, and two of 137 feet, with four piers, two of which are in the stream and two

at the water's edge. The length of iron superstructure is 865 feet.

The roadway is 67½ feet wide, with sidewalks of 16½ feet, and at centre is 52 feet above mean water and 83 feet above the deepest rock foundations of the piers. The bottom chord is 24 feet clear of the water, and the shore drives will have 18 feet in the clear.

The pier masonry is built of Maine granite from Blue Hill and Bucks Harbor, as is also the coping and parapets.

The abutments are made of Port Deposit granite, backed with Conshohocken stone and brown sandstone from Prallsville. Quoins are made of a dark stone from the Belleview quarries near Wilmington, Delaware.

The foundations are all on solid rock. At the abutments, this was from 5 to 15 feet from the surface. The abutments are of concrete to an elevation of one foot below the shore drives, and above that of cut stone. At each of the four corners an archway is constructed for access to the lower chord, where a provision is made for a footway crossing the river.

The river piers were constructed by first dredging to the rock, and then sinking double-walled, bottomless caissons to the bottom. The rock was then thoroughly cleansed by divers using a centrifugal pump, and the space carefully filled with concrete, consisting of one part Coplay Anchor cement, one part of sharp river sand, and four parts of broken furnace slag. This was filled in, in layers of 2 feet, up to 18 feet below mean water; then a water tight caisson, with a well made bottom of yellow pine timber, 3 feet thick, was floated into position and sunk on the concrete, when rough masonry was built therein to two feet below mean water. From this point the cut stone was built in courses.

No. settlement has thus far been detected in any of the piers. The extreme pressure on the foundations, including moving load, will not exceed 45 pounds per square inch, while frequent tests showed that the concrete, after 30 days insertion in the water, would bear 308 pounds per square inch. On account of the old timber wharf and culvert at the east pier, a coffer dam was built and an open excavation made to the rock bed.

The superstructure consists of seven quadrilateral Pratt trusses to each span. The upper chords and posts are phœnix columns, and the lower chords and diagonal bars are phœnix weldless eye bars.

It is proportioned to carry 100 pounds of moving load per square foot, in addition to its dead weight of 200 pounds, making a total of 4,286 pounds per lineal foot on each truss.

The roadway is to be laid with granite blocks, and will be separated from the sidewalks by iron tube railings.

The sidewalks will be of slate, with encaustic tile borders. There will be a refuge bay over each pier, with highly ornamented cluster lamps, and the balustrade and cornice will be ornamented with panels of solid bronze, representing birds and foliage.

The work has progressed without any cessation during the winter, and with present prospects, will be completed in advance of the time fixed in the contract.

The contract with James F. Kennedy for graduation and masonry of Fairmount bridge, was signed on the 11th day of July, 1872, the time fixed for its completion being thirty months from that date. Fifteen months had elapsed from the time at which the proposals were made before the contract was executed, and during that time the erection of public works had created such a demand for building material, that the contractor found it impossible to procure suitable stone at such rates as would make his contract remunerative. So much time was consumed in his effort to secure quarries on more favorable terms, that, at the first of the year 1873, but little more than a commencement had been made. On the 11th of July he had laid the foundations of the Thirtieth street abutment with its south retaining wall, and excavations from 35 to 42 feet in depth had been made for three towers and one shaft on the west side of the river; some of these had been built up to street grade, and 190 feet of retaining wall on Biddle street had been built to its full height, showing a face of thirteen feet above street grade. The monthly payments at this time had amounted to $27,500, when the contractor abandoned the work.

The contract to complete the work contracted for by Mr. Kennedy was awarded to Wm. M. Wiley, who commenced work on the 21st day of October.

At the close of the year the excavations for foundations of nine of the twenty colonnade shafts on the west side of the river had been made to the natural rock, the greatest depth reached being fifty feet below the roadway, twenty-six feet below high water. The retaining wall on Biddle street is built to the length of 540 feet, reaching a height of twenty feet.

The bridge and approaches, when completed, will extend from Twenty-fifth and Spring Garden street to Thirty-second and Bridge street, a distance of 2730 feet. The river is crossed by a single span of 348 feet, with roadway on upper and lower chord, the whole width being 50 feet from centre to centre of outside footways.

The upper roadway will rise from Twenty-fifth street along the side of Fairmount embankment, and will reach an elevation

of 30 feet above the present street at Callowhill street, which will be crossed by spans of 60 feet, made of wrought iron plate girders.

Thirtieth street is crossed by a truss of 84 feet span, and from Thirtieth street to the west abutment of the Pennsylvania Railroad, the road will be supported on plate girders and piers 34 feet 6 inches apart.

The river bridge is the "Linville Truss," proportioned to carry 150 pounds per square foot, exclusive of its own weight. The iron work is being done by the Keystone Bridge Company at the Pittsburg shops.

The cut stone is made of Maine granite, the piers of Port Deposit stone, and the retaining wall of red sand-stone from Lumberton and Prallsville, backed with Conshohocken limestone.

Several of the excavations for shafts which have been made to the rock, have passed through the grillage and piling of the old foundations, and an opportunity has thus been afforded to inspect the character of the work. Although sufficient for the old structure, the indications are that the old abutments will not answer for the additional weight of the new bridge. Several courses of masonry would have to be taken down to reach the full width of the towers. It will, therefore, be better to rebuild the abutments than to sink pneumatic cylinders which would only support the main span.

The short turns along the reservoir on the new line of the bridge were so objectionable that efforts were made to change the site but the complications of the contracts interfered.

The difficulties attending the construction on the site of the old bridge, increase the cost and show that the new and direct line would have had great advantages. The contractor has had the benefit of favorable weather and has prosecuted the work without interruption.

The estimates for graduation and masonry now amount to $32,000.

The work on South street bridge, which is being erected by the South Street Bridge Commission, is supervised by the Chief Engineer and Surveyor, and the monthly estimates are made out by him.

The masonry, amounting to 29,875 perches, is now complete.

433,225 feet, B. M., of timber have been used in platform grillage and cribs, and 1,114 piles have been driven for foundations for main abutments and approaches.

The bridge extends from South and Chippewa streets, to the west side of the West Chester Railroad, a total length of 2,419

feet; the river span is 584 feet, consisting of two permanent spans of 185 feet each, and a pivot draw with two openings of 77 feet each, supported on cylindrical cast iron piers.

The width of the approach is 55 feet, with 35 feet carriage way, and sidewalks of 10 feet each.

The river span is a thorough bridge with two trusses, 36 feet from centre to centre, outside of which are footways 6 feet wide.

The contract is for a fixed sum of $770,000, which includes guard colums for the piers for each permanent span, but no provision was made for guards to the pivot draw, which are required for the protection of navigation and the bridge. Cribs have been substituted for the guard columns, and they are now partially constructed.

The iron is being delivered for the superstructure, none of which is yet erected.

The bridge crosses the river nearly at right angles to the current, to accomplish which, a curve takes place on the South street approach. The streets on the west side of the river, have been adjusted to conform thereto. The approaches through the Almshouse ground will have to be graded and paved by the City, to Thirty-fourth and Spruce streets, before the bridge can be available for travel.

The bridge over the Reading Railroad at Fifth street is under contract with the Philadelphia & Reading Railroad Company. The abutments are completed and ready for the superstructure.

The bridge at Ridge avenue is prepared for the iron superstructure.

The plans for carrying the tracks by a bridge over Richmond street are complete. The Railroad Company having raised their tracks 6 feet, a satisfactory passage way is secured. As the appropriation is now made, this improvement, which has been demanded for nearly 20 years, will be completed at an early day.

The Pennsylvania Railroad Company, lessees, have partially built the abutments for bridges at Columbia avenue and Park avenue, over the Connecting Railroad; but have suspended the work for the present.

The operations of the Registry Bureau have been continued with the same force as heretofore.

The following is a statement of the number of lots received and plotted during the year.

Total number of descriptions received to December 31, 1872,	186,983
Received during the year 1873,	22,538
Total received to date,	209,521

Number of original lots plotted, December 31, 1872,		120,916
" " " during 1873,		6,916
Total to date,		127,832
Transfers entered December 31, 1872,		52,119
" " during 1873,		14,094
Total to date,		66,213
Original lots plotted during 1873,		6,916
Transfers entered " "		14,094
Total entries during the year 1873,		21,010
Receipts for certificates, &c.,	$135 85	
Expended for postage stamps,	13 00	
Balance paid to City Treasurer,	$122 85	

One clerk is constantly engaged in making out searches, which conveyancers now generally procure upon transfers of property. The charge made, which is only 25 cents, is too low, and should be increased so as to pay for the time occupied. The value of these records is shown by the constant demand for their examination by conveyancers and lawyers. They have now assumed such shape, that they are indispensable to the Board of Revision of Taxes, for the use of the Assessors, the City Departments and citizens generally. One hundred and five large plain books are in constant use, but there is great necessity for the extension of the work, so as to cover the whole City. The rural portions of the First, Twenty-sixth, Twenty-fifth, Twenty-third, Twenty-second, Twenty-first, Twenty-eighth, Twenty-fourth, and Twenty-seventh Wards have not yet been taken up.

Transfers and searches have increased so much, that the present force can do but little beyond keeping the entries up to date in the books now in use; so that to extend the work two additional draftsmen are required.

I may say, in conclusion, that unusual activity in each division of this department has kept everyone busily employed. Many estimates and plans which have been made, are not noticed, while a number have been deferred in the engineering department, because they could not be carried through with the present force.

Respectfully submitted,

SAMUEL L. SMEDLEY,

Chief Engineer and Surveyor.

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR,

FOR

THE YEAR 1883.

Presented to the Mayor, March 10, 1884.

SAMUEL L. SMEDLEY, Chief Engineer and Surveyor.

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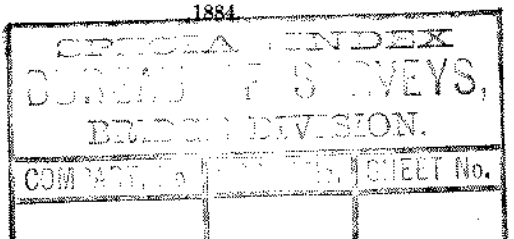

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR,

FOR THE YEAR 1883.

Philadelphia, March 10, 1884.

HON. SAMUEL G. KING,
Mayor of the City of Philadelphia.

DEAR SIR:—I respectfully submit the following report of the expenditures, receipts, and work done in the Department of Surveys, during the year 1883.

The annual appropriation to the department was $43,104, of which there was expended $41,964.27, leaving a balance of $1,139.73, to merge at the end of the year.

The receipts for 1,164 permits for sewer connections amounted to $4,851.50: miscellaneous accounts to $23.75, and from 7,215 certificates of search in Registry Bureau, $1,903.75, making the total receipts $6,779.

The receipts in 1882 were $4,859.75; an increase for this year of $1,919.25.

There were 18,225 descriptions of properties received for registry, making a total since the organization of the Bureau in 1865 of 370,670. During the year 5,022 lots were plotted in the plan books, making a total of 191,928. Of transfers of property 16,688 were entered in the books, making a total of 220,168.

The registry of the change of ownership of lots in the built up portions of the city, including Bridesburg, Frankford, Ger-

mantown, and Manayunk, are now entered up each day. The rural portion of the Twenty-eighth Ward has been arranged for mapping, and draughtsmen are now engaged on the rural portions of the Twenty-first, Twenty-second, and Twenty-seventh Wards.

Under various ordinances of Councils, plans have been prepared and filed for the fixing of lines and grades of twenty-one individual streets. There has been completed and filed, the revisions of sectional plans covering an area of 3,447 acres, and the topography of 3,851 miles; making the total area of topographical maps 21,690 acres.

Demands for the revisions in lines and grades of streets are constantly occurring.

In many places where streets have been planned in advance of general improvement, new conditions, and requirements have arisen where it is impracticable or inadvisable to carry out the original plan. Generally some developments have been made in accordance with old plans, which greatly increase the difficulty. All such changes have to be first authorized by Councils. The Board of Surveyors proceed with great deliberation and caution in the confirmation of such plans, because under the new Constitution the door is wide open for claims against the city, even in trifling cases. As it is so easy for those entering suit to submit testimony of the most exaggerated character, while citizens are reluctant to appear and give reliable evidence on behalf of the city, thus running the risk of the ill will of the claimants; jurors who are often drawn from occupations which give them no qualifications to properly judge in such matters, make awards, which under the color of law, are a great burthen to the city.

Most of the revisions claiming the attention of the Board of Surveyors, this year have been along the line of numerous steam railroads, both old and new, which intersect the city in all directions. The enormous increase in traffic and the demand for rapid transit has awakened their officers and the community to the necessity of dispensing with the dangerous

grade crossings on the old roads. An intelligent foresight in building several new lines now in course of construction has induced their managers to build or provide many bridges, and nearly dispense with grade crossings.

For safe clearance of overhead street bridges a difference in elevation of 20 feet between the rail and street is so great, as to result in great injury to property and expense to the city, and also railroad companies in making changes from grade to bridge crossings. Where the tracks have been laid at a certain elevation, ballasted, and turnouts established, a depression of grade must be attended with great inconvenience and expense.

The time when this can be accomplished with least expense is at the first construction of the railroad. At that time the elevation or depression of a road involves the excavation or embankment of a narrow strip of ground corresponding with the width of the railroad, whereas subsequent change requires the deposit or removal of about ten times the amount of material by the city and property owners in making approaches.

In many places the old plans were confirmed with only 15 feet difference between rail and street grade. When they were prepared that elevation was regarded as sufficient for bridging, but larger locomotives and cars are now in use, and safety of employees makes a greater headroom necessary. Where houses have been built and streets graded and paved to old grades, and the construction of bridges called for, the securing of the additional five feet as now required, is attended with many difficulties.

Under the Act of April 21, 1855, no railroad company had the right to locate and construct a road within the limits of the city without first submitting the plans and survey thereof exhibiting the grades and routes to the Board of Surveys, who were empowered to conform the same as far as practicable to the general plan regulations of the city. This act was repealed on April 23, 1864, and the law now only applies to street passenger railways.

Many revisions are required on the line of the new Pennsylvania Schuylkill Valley Railroad, and on the Germantown and Chestnut Hill branch of the Pennsylvania Railroad, which can generally be accomplished without great difficulty. The development along the line of the latter makes a general remodelling of unopened streets advisable in the Twenty-second Ward, in the vicinity of Paper Mill Run, Cresheim Creek, and along the banks of the Wissahickon, so as to conform more nearly to the topographical features of the country, abandoning the parallel lines and rectangular system so generally in vogue. A broad avenue with easy grades is projected along the valley of Paper Mill Run, from the Wissahickon drive to Mt. Airy.

A section of the city between Germantown avenue and Wissahickon avenue, from Nicetown lane to Roberts avenue, the southern limit of Germantown, was carefully planned some years ago, so as to make the best arrangement for access to the city that the condition of the roads in that vicinity then afforded. Within the last few years a perfect network of connections, between the Reading Railroad and the Germantown and Chestnut Hill Road, at varying elevations, have been made, so that it has become absolutely impossible to carry out the plan, and extremely difficult to arrange any other perfect or convenient plan of streets.

Pulaski street, which was formerly a plank road, crossing both railroads by bridges, was a popular drive from Germantown to the central part of the city. The new connection between the two bridges make two grade crossings and an additional bridge, in close proximity to the old one over the Reading Railroad with four feet greater elevation.

These have made the street so dangerous that travel on it is nearly abandoned.

A revision of the plan has been authorized, and much time spent in calculations and negotiations with the railroad company, to devise a through communication that will be convenient and safe.

The Act of Assembly which created Fairmount Park, provided that Thirty-third street along its east border should be made 100 feet in width, from Pennsylvania avenue to Ridge avenue, but made no provision for its extension southward to Girard avenue. The public convenience demands that this connection should be made to accommodate travel which must be concentrated there because other streets have been obliterated by the Park.

It is also essential that this avenue should be made as free of danger from the railroads as possible. A plan has prepared for carrying the avenue over the Reading and Connecting Railroads by bridges, at such an elevation and with such screening by embankments and planting, as will make a safe line of travel, not only for the business community but for pleasure driving through the Park.

A large amount of filling will be required, the valley which formerly existed south of the railroad has been used as a dumping ground, and is already filled up about forty feet without expense to the city. The bank is now ten feet above the railroad tracks, and by continuing the process a few years longer, the requisite elevation for carrying out the project can be secured at a trifling expense.

The Board of Surveyors had before them an application of the Schuylkill River and Gray's Ferry Passenger Railway Company, for the approval of their plans on Twenty-second street, from Filbert street to Walnut street, which they were authorized to use by their charter, but were prevented from doing so by the obstruction of the wall of the city railroad on Market street. This has been removed, and they now desire to transfer their tracks from Twenty-third street, and make the line continuous on Twenty-second street, running southward.

The Philadelphia City Passenger Railway Company have a track in the centre of Twenty-second street, from Walnut street to Chestnut street, upon which their cars run northward. They refuse to remove it from the present central location, and the

laying of additional tracks would prove an obstruction, which affects the general public as well as the private owners, because special improvements have been made with the view of adapting this street for a popular drive to the Park. The Board declined to approve their plan, but approved of running both lines on one track with a turnout, on June 18, 1883. The railroad companies have not accepted this arrangement and the matter is now in Court for determination.

The plans for a cable railroad on Market street were approved on September 17, from Delaware avenue to Thirty-second street, nearly in the locations now used for horse cars.

The unsatisfactory condition of the railway tracks on Callowhill street, from Twenty-third street to Fairmount Bridge, has claimed the attention of the department on several occasions.

The Race and Vine Street Company having priority in laying down their rails on this street, which is only 26 feet between curbs, a portion of which was double track, refused to permit the People's Line to pass over their road.

Litigation ensued, and when the Court decided in favor of the People's Line they hastily laid down two additional tracks without the approval of the Board of Surveyors.

A portion of the street therefore has three tracks, and near Fairmount Bridge there are four tracks in this narrow street. This intolerable nuisance has existed for a number of years, making the street difficult to drive upon, and almost obstructing the passage at the east end of the bridge.

Three years ago I prepared plans for a railway terminus in the open space south of the bridge, to be used jointly by the different companies, and endeavored to get their officers to agree to its use and the removal of the extra tracks.

Although they all seemed favorable at that time, nothing was ever accomplished, and in the meantime changes in the management have taken place.

The obstructions are such a serious detriment to the use of the highway, some measure should be undertaken by authority of City Councils to effect a change by negotiations or otherwise.

A list of the names of streets throughout the city has been compiled from the records, and their extent and relative position marked on the charts. A careful study has been made, for the purpose of discontinuing duplication, and also to dispense with a multiplicity of names of short streets, similarly located between main thoroughfares, so that one title may be adopted for all thus situated.

By ordinance of 1858, a great many duplications were abolished, but there are still many notable instances of repetitions. There are yet 10 Church, 8 Brown, 7 Chestnut, and 6 Cedar streets, etc., etc.

As an instance of the other class, there exists between Pine and Lombard streets, from the Delaware to the Schuylkill rivers, fifteen names to short streets nearly in the same line, viz.: Stampers, Tenor, Alford, Minster, Souder, Barley, Ohio, Kneass, Stone, Richard, Addison, Ringgold, Wall, Hand, and Ashburton, all of which could be as well designated by the last or any other single name in the list.

Attention has been given to the appropriateness of certain names, the circumstances under which they were given, and whether priority in date or extended use and repetition in grants and transfers of titles should determine the question, as to which should retain the original.

Many other considerations have received due weight, so as to accomplish the purpose with least confusion and inconvenience in making conveyances of property.

The work so far embraces 60 pages of manuscript; 1,500 street names can be dispensed with, and the number reduced to about 1,200.

The changes proposed are now nearly completed, and will be submitted for the consideration of Councils in an ordinance at an early day.

Main Sewers.

Mill Creek Sewer.

Previous to this year, Mill Creek sewer had been built from Woodland avenue along Forty-third street to Sansom street, and westward on Sansom street to Forty-sixth street, generally 20 feet in diameter, a distance of 5,200 feet; also, sections of the same on Meadow street, at the crossing of Chestnut and Market streets; an old bridge existing at the crossings of Haverford street.

Northward of Haverford street the creek runs through a deep valley, and the streets on each side of it have been generally opened and built upon, the valley cutting off through communication and the stream preventing the grading of Silverton avenue, Aspen and Oregon streets.

During this year 774 feet of circular sewer, 15 feet diameter has been built on Forty-seventh street, from a point 164 feet south of Silverton avenue, to 140 feet north of Aspen street, and the stream has been diverted from the old bed and carried through the sewer so that the streets crossing it can now be graded and opened, to the established grade, requiring a filling of 30 feet.

The work was commenced on the first of March, and completed on the first of October, at a cost of $35,123.16, of which $33,296.19 was paid by the city, and $1,340.31 by property owners. The cost of inspection was $486.66.

The masonry is all very substantial, cement of excellent quality and superior hand made bricks having been used.

Canal Street Sewer.

An Act of Assembly was passed as early as 1861, authorizing City Councils to culvert Cohocksink Creek, and divert its course by building an outlet on any street giving the most direct course to the Delaware river. Accordingly, in the year 1869, a sewer 16 feet in diameter was built over the stream,

a distance of 900 feet, from Front street to Laurel street, a point about 2,000 feet from its mouth. The sewer was then carried direct to the head of the dock east of Delaware avenue, along Laurel street, a distance of 700 feet.

The stream of water being thus cut off, the lower end of the creek which was very tortuous was left without any source for flushing, except the ebb and flow of the tide, which resulted in an offensive and intolerable nuisance. An ordinance of Councils of March 18, 1878, authorized the Board of Surveyors to change the bed of the creek to a public street, with the proviso, that parties interested should file a bond indemnifying the city against any cost therefor.

The Act of 1797 made the creek a navigable highway, and certain property owners refused to release their rights to the water privilege, so that the bed of the creek remained in its unhealthy condition until the proviso was stricken out by ordinance of December 22, 1881, and the Board of Surveyors prepared the plan, making Canal street a public street of the city.

Before filling in the new street, a sewer was required to carry off the sewage, from a number of manufacturies along the line, all their drainage having been arranged to run in the canal. These buildings were but little above the high tide, and the grade of the street could not be made much above that elevation, so that a sewer to drain them had necessarily to be kept within the range of high tide, *i. e.* 2 feet above low tide at the outlet, and one foot below high tide at the upper end, the total fall being 4 feet.

The bed of the creek was a mass of mud and filth, and piles about 25 feet in length were required throughout the whole length, a distance of 1,652 feet. 533 feet of the sewer is circular, 4 feet in diameter, and 1,119 feet egg-shaped 2 x 4 and 3 x 6 feet, with a 12 inch pipe connecting the upper end with the Laurel street sewer for flushing.

City Councils by Ordinance of November 4, 1882, appropriated money for the construction of this sewer. It was commenced March 20, and completed August 29.

The total cost was $17,473.66, the property owners paying $3,992.20 and the city $12,954.80, cost of inspection $526.66.

144 branches for house connections were inserted, and junctions for sewers were made on Beach and Llewellyn streets. The difficulty of construction was greatly increased by a deposit of coal tar from the Kensington Gas Works, of many years accumulation through which the sewer was built, to a depth of 6 to 8 feet, for about five hundred feet of its length. The stone arch bridge built across the canal at Beach street about 40 years ago, was torn down and the material used for cradling.

The discharge of sewerage from 2,300 acres of the Cohocksink basin, more than half of which is now closely built up with houses and factories, is continually filling up the dock at the outlet, and a suit was instituted against the city for damages by owners and occupants of adjoining wharves.

The suit resulted in favor of the city, on the ground that the title of property owners only extends to low water, that the use of wharves beyond that line is obtained by license from the Commonwealth under certain regulations, and that the state having by Act of Assembly authorized the outlet to be made at that point, there was no recovery for damages.

York Street Sewer.

This sewer has been projected to afford relief from storm water. Between Front street and Trenton avenue, and Norris and Huntingdon streets, there exists a closely built manufacturing district covering 500 acres, a mile from the Aramingo canal, a tributary to the Delaware river, with higher ground intervening.

Before the territory was so closely built upon, the old circular sewer 7 feet in diameter on Huntingdon street, was sufficient to afford relief from ordinary storms, but on many occasions recently, this sewer has been inadequate, and as all the water could not escape by the sewer or streets to the river on account of the intervening high ground, damage resulted from flooding a great number of manufactories.

The street grades were established before consolidation in 1854, and expensive buildings over most of the area rendered changes in their elevation impracticable. The cheapest remedy at this date, therefore, must be obtained by greater sewer capacity. The sewer on York street is located in a direct line from the Aramingo canal to the centre of this low district, a distance of 4,000 feet. The section adopted is egg-shaped of 5 feet vertical diameter by 3 feet 4 inches horizontal. Work was commenced July 24, 1883, 1,801 feet are completed at a cost to the city of $12,611.84, and $400 was spent for inspection.

The contractor used "Carson's Excavating Machine," with satisfactory results. By the machine the earth is raised out of the trench 17 feet deep and 7 feet wide by buckets, which are transported to the rear on a frame work 10 feet wide and 15 feet high. A clutch with rollers on an elevated rail is worked by a stationary engine with wire ropes, and the material is dumped into the trench where the sewer has been completed. A space 10 feet wide and 60 feet long, is sufficient to handle the material. This causes but little obstruction in the street and affords an economical means of transporting the earth.

West Cohocksink Sewer.

In the year 1878 this sewer was built on Dauphin street, from Sixteenth to Nineteenth streets, 10½ feet in diameter, and there terminated. In 1882 a section was built on Sedgley avenue, from Twenty-sixth to Twenty-fifth and Dauphin street, leaving a space of 2,600 feet on Dauphin street, from Nineteenth street to Twenty-fifth street unprovided for. The street had not been opened and as it was located through one corner of Odd Fellows Cemetery, there was no prospect that the construction on this line could be accomplished for many years. Hermann street, midway between York and Dauphin streets, was therefore laid down on the city plan for a sewer street. To follow this line several right angle turns in the sewer would necessarily be made, which are undesirable. At

this juncture Mr. William Singerly, a large property owner, with commendable enterprise, purchased a tract of land adjacent to the line for the purpose of improving it by building thereon. To accomplish this he has torn down a valuable mansion house in the line of the street, and dedicated the ground for a length of three squares without cost to the city, and has made agreements with the Cemetery Company to give them other land in exchange for theirs, so that Dauphin street can shortly be opened its entire length.

This has enabled the city to proceed with the construction of the sewer in a direct line, and it is now under contract.

Excavation estimated at $2,862 has been made, but no brick or stone work will be laid until next Spring.

Manayunk Intercepting Sewer.

Section 3, along the east Schuylkill river drive in Fairmount Park, extending from Turtle Rock to Girard avenue, was commenced June 22, and completed October 1, 1883. The length, which is 2,400 feet, cost $40,752. Inspection, $333.33.

This sewer is 4½ feet in diameter, with a grade of 1 in 2,500. The interior of the invert is plastered with a double coat of Portland cement mixed with fine sieved bar sand, put on in hard finish; the whole interior is made as smooth as a white-coated wall in a dwelling house. The test levels on the brick work in the bottom show no variation from the grade, amounting to one-half an inch, and this was reduced in plastering. The coefficient of roughness can therefore be estimated with $n = 0.011$, in Kutter's formula, giving a velocity of 3 feet per second when running full, or 2.4 feet per second with one-fourth of maximum discharge, sufficient for self cleaning.

Of this section 2,150 feet was built in cradle, of which 840 feet had timber foundations, consisting of 8 by 8 inch stringers, covered with two courses of 3-inch planking laid diagonally. All the timber is below the surface of the water in Fairmount Dam.

The contract for Sections 1 and 2 of the intercepting sewer was executed January 23, but owing to the delays in the approval by Councils, the work was not commenced until November. But little work has been done excepting tunnelling through the rock at Fairmount Reservoir: this has been started in three places, the headings having been driven to the respective distances of 77, 39, and 51 feet.

Branch Sewers and Inlets.

During the year 40,385 feet of branch sewers have been built, with 213 manholes and 20 inlets, at a cost of $130,488.31, of which $98,588.02 has been paid by assessment bills against property owners on the line of sewer at the rate of $1.50 per foot except corner lots, and $38,900.31 has been paid by the city. The average cost of sewers has been $2.91 per foot; of manholes, $26.44; and of inlets, $71.10. Inspection has amounted to $5,711.54, or 14 cents per foot. The average total cost being $3.23 per foot.

Branch sewers, with few exceptions, have been built of brick, and oval in form, varying in size from 2 feet 4 inches by 3 feet 6 inches to 1 foot 8 inches by 2 feet 6 inches. Slants of terra-cotta pipe, 6 inches in diameter, for house connections, have generally been inserted in front of each house or lot, and 20 feet apart where blocks are not subdivided, and also slants 12 inches in diameter have been built into the brick work where inlets will be needed in the future.

The practice of omitting proposals for inlets in connection with each sewer contract because lower bids were received for them when all inlets required for the year were contracted for separately, should be abandoned. The slight additional cost, if any, will be compensated for in the advantages arising from building them at the time the sewer is under construction.

The appropriations for branch sewers are made to the Highway Department, which has also heretofore had charge of their construction, but for the past year they have been under the supervision of the Survey Department. Councils have by or-

dinance authorized the employment of Inspectors to act under the direction of the Chief Engineer and Surveyor for the purpose of securing proper material and workmanship in the construction of sewers, drains, and inlets.

It is their duty to remain on the ground during the whole time of construction of each sewer; to reject all material and workmanship not in strict accordance with the contract and specifications; to make reports on tests of materials, and on completion to file a sworn certificate that the work has been done in accordance with the contract and specifications.

This authority has enabled the department to effect a revolution in the character of workmanship and material used in sewer construction, and furnishes the Chief Engineer and Surveyor with a knowledge of what is actually being done, which was formerly impracticable to obtain when the work was done by the Highway Department without sufficient authority for any systematic inspection or supervision. All construction of sewers and bridges is now under rigid inspection by competent men. The results of which can hardly be estimated at present, but the future will show that the extra expense of a thorough inspection will be amply repaid in the permanency and stability of the work.

Sewers built at private expense have also been inspected as directed by resolution of the Committee on Surveys. The specifications heretofore used for sewers have been amended, and such improvements introduced as experience has made advisable. Cement used during the year has been carefully inspected and frequently tested.

The requisition of the department has induced some dealers to pay special attention to the manufacture of cement of a high standard. The bricks used in the construction of main and branch sewers have been of good quality and fully up to the requirements of the specifications.

The Inspectors employed are generally master builders and masons, experienced practical mechanics. They are paid by the month, and only when on duty, and, therefore, lose much time in the course of the year.

At times as many as ten Inspectors are required, and they claim that they should receive a yearly salary; that the present plan does not offer sufficient inducement, for men with the necessary ability and experience, to give up their regular business. If one-half of this number were employed by the year all intermediate time could be profitably used by inspection of existing sewers, which is very necessary, and also on special inspection of value to the department.

The cast iron No. 2 inlets have been in use for several years, and have given entire satisfaction. They are formed of 3-feet cylindrical basins $\frac{3}{4}$ of an inch in thickness and 5 feet 6 inches in depth, with 12 inches of water trap, all in one casting, and consequently absolutely water-tight.

They have flag-stone covers, which are preferable to granite, at that becomes polished and consequently slippery, in wet or icy weather. A smaller size, No. 3, is 5 feet 7½ inches deep, 2 feet 6 inches in diameter, ½ inch thick, with a hinged cast iron cover and grating bolted to cylinder. This size has 12-inch trap, cast entire with cylinder, and has been found to be of great value where the supply of water for trapping is very small and there is necessity to get rid of cross gutters or surface overflow.

The foundrymen at first found great difficulty in casting these inlets entire, and many of them broke by contraction in cooling. But perseverance and experience has rewarded them with success, resulting in the production of an inlet with trap absolutely water tight, which is not likely to become leaky or require any repairs.

The evil effects of discharging exhaust steam and boiling water into the sewers has long been felt, and many complaints have been made on this account.

Ordinances forbidding it have been introduced in Councils several times during the last few years, and the subject has been considered by the Survey Committee, without accomplishing anything until this year, on account of opposition from the manufacturing interests, who, to a large extent, have made use

of the sewers for the purpose, and object to the outlay and inconvenience of making changes. On July 6 an ordinance was passed requiring owners or tenants to discontinue the discharge of exhaust steam into sewers, and to sever the connection, and provide other places, under a penalty of $50, and forbidding any blow off or discharge of boiling water without the intervention of a cooling tank of sufficient dimensions.

Bridges.

Plans have been prepared for rebuilding the west approach of South Street Bridge, and for repairing the draw and main spans; contracts have been awarded for the latter, to be commenced at the closing of navigation in the river. The plans for the approach consist of nine 49 feet plate girder spans, supported by iron columns, resting on the old foundations of the stone arches. It is proportioned for 100 lbs. per square foot on a roadway 35 feet 8 inches wide, to be paved with granite blocks, and two footways of 9½ feet each, with granolithic pavement.

Various plans have been considered for repairing Chestnut Street Bridge, under the advice of Mr. Joseph M. Wilson, C. E., whose services were secured by authority of City Councils. It has been concluded to invite proposals for sinking four circular wrought iron cylinders 8 feet in diameter, by the pneumatic process, placing them at an angle of 45° and filling them with concrete from the bed rock to the base of the masonry in the west abutment, which is built on piles, driven through muck and gravel to the depth of about 40 feet. These and the shore arches have been found insufficient to withstand the thrust of the main cast iron arches. The plan proposed will furnish the most direct application for resistance in the line of pressure, transmitting it to the solid rock through columns about 66 feet in length.

The detail, plans and specifications, for the projected stone bridge 100 feet wide across the Schuylkill river at Market street, described in the last annual report, have been completed

and proposals for the work invited, to be opened in January, and also for a temporary wooden bridge for use while the stone bridge is undergoing construction.

Plans were made for a new drawbridge over Frankford creek, at Orthodox street, but it was finally concluded to put the old one in thorough repair.

The following bridges in the Twenty-third Ward have been built under the supervision of the department, to supply others destroyed by the floods.

Castor Road Bridge over Sandy run, a stone arch 14 feet span, cost $1,160, Academy road, bridge over Byberry creek, 2 stone arches 20 feet span, cost $4,240. Tacony road, over Wissinoming creek, brick arch on piles, 17 feet span, cost $4,970. Byberry road, west of Somerton, stone arch 12 feet span, cost $1,425, and Willets Road Bridge over Byberry run, stone abutments and iron superstructure, 34½ feet span, cost $4,690. Increased water-way was given in all cases, and all of the bridges had substantial retaining walls on the approaches.

Port Wardens' Lines.

The surveys of the River Schuylkill have been completed from South street to the Delaware river, with soundings and cross sections of the stream.

Much time and labor has been bestowed by the department in preparing plans establishing lines for the Port Wardens, and measures have been taken to connect the streets on both sides of the river and reconcile differences in the standard, by which well defined locations can be preserved.

While such a stream requires sufficient width of water-way to accommodate the water during floods, commerce demands wharfage near enough low water channels to float the vessels while loading or discharging their cargoes. To accommodate both conditions two lines have been adopted; the one farthest from the channel, is intended for the limit of solid structures or bulk heads, the other fixes the line of the end of the wharves, which are required to be built on piles between the two sets of

lines, and kept open for the flow of water between the timbers which support them.

The following are the maximum and minimum widths at various places: At the U. S. Arsenal, 380 feet and 420 feet; Gray's Ferry, 360 feet and 520 feet; Gibson's Point, 400 feet and 580 feet; Point Breeze, 390 feet and 540 feet; Yankee Point, 490 feet and 760 feet; and at Penrose Ferry, 600 feet and 900 feet, gradually increasing in capacity to the mouth of the Schuylkill river.

These plans were carefully considered by the U. S. Engineers, and approved by them October 19, 1883, and finally confirmed by the Board of Surveyors the same day.

Plans have also been considered by the Board of Surveyors for similar lines on Frankford creek, and for straitening the channel; at a day fixed by advertisement property owners interested were heard, but no action has yet been taken to establish Port Wardens' lines on that stream.

Port Wardens' lines have never been established on the Delaware river above the mouth of Frankford creek. As there have been a number of applications for wharf extensions between Bridesburg and Tacony a survey of the river northeast of Bridesburg is greatly needed in order that lines can be fixed for the control and regulation of wharf construction.

On January 6, John D. Estabrook, Assistant Engineer, was elected Chief Commissioner of Highways by City Councils, and John K. Little, who has been connected with the department for 11 years, was appointed in his place. He has oversight of Inspectors and the construction of sewers and bridges.

The responsible duty of computing and proportioning for bridges and sewers is in charge of J. Milton Titlow, who for 12 years has been the principal Assistant Engineer. The drafting in the Engineer Department comes under his supervision.

City plans of streets and grades and records of the purchase and sale of real estate for the use of assessors and convey-

ancers has been in charge of John H. Dye since the establishment of the Registry Bureau in 1865.

The Recording Clerk, George Sturges, has held the position since the organization of the Department in the year 1855.

The plans and records in the department, few in number at the time of consolidation, have been systematically preserved and indexed, and arranged so as to be of easy access, and during the last decade have increased greatly in number and value.

Respectfully submitted,

SAMUEL L. SMEDLEY,

Chief Engineer and Surveyor.

Number of licenses issued to connect with sewers during 1883.

January	32	July	96
February	28	August	122
March	93	September	94
April	125	October	104
May	134	November	159
June	125	December	34
		Total	1,146

Tabular statement of connections with sewer made in each Ward during 1883.

Ward.	No.	Ward.	No.
First	24	Seventeenth	24
Second	10	Eighteenth	27
Third	8	Nineteenth	98
Fourth	9	Twentieth	81
Fifth	47	Twenty-first	6
Sixth	34	Twenty-second	23
Seventh	42	Twenty-third	4
Eighth	66	Twenty-fourth	95
Ninth	34	Twenty-fifth	25
Tenth	50	Twenty-sixth	3
Eleventh	11	Twenty-seventh	33
Twelfth	13	Twenty-eighth	94
Thirteenth	23	Twenty-ninth	96
Fourteenth	44	Thirtieth	10
Fifteenth	86	Thirty-first	16
Sixteenth	10		
		Total	1,146

Table showing character of drainage during 1883.

Surface	681	Stables	3
Water closets	1,306	*Exhaust steam	4
Water privies	222	Slaughter house	5
Sinks	404	Miscellaneous	10
Cellars	125		

*Connections prohibited by ordinance of July 6, 1883.

Branch Sewers built at Public and Private expense.

	Egg-shaped.	Egg-shaped.	Egg-shaped.	Circular.	Circular.	Circular.	Circular.	Total length.
	2 ft. 4 in. x 3 ft. 6 in.	2 ft. x 3 ft.	1 ft. 8 in. x 2 ft. 6 in.	3 feet.	18 ins.	15 ins.	12 ins.	
Built by the city.....	23,524.	13,547.83	579.60	2,491.60	.....	242.	.....	40,385.03
Built at private expense...	1,377.	1,560.50	.....	.....	400.	.....	4,204.	7,541.50
Total.....	24,901.	15,108.33	579.60	2,491.60	400.	242.	4,204.	47,926.53

Total length of Sewers built in 1883.

	Feet.	Miles.
Main sewers.....	6,496.	1.230
Branch sewers.....	40,385.03	7.649
Branch sewers, private expense.....	7,541.50	1.428
Total.....	54,422.53	10.307

Branch sewers built by the City during 1883—Length, sizes, and cost.

Branch sewers.				Brick and stone inlets.			Manholes.			Inspection.						
Length.		Total cost.	Average per foot.	No. built.	Total cost.	Average cost each.	No. built.	Total cost.	Average cost each.	Total cost.	Cost per foot.	Amount paid by city in warrants.	Amount paid by property owners in Ass't bills.	Total cost.	Average cost per foot.
Feet.	Miles.														
40,385.03	7,649	$117,723 29	$2 91.5	20	$1,422 00	$71 10	213	$5,631 50	$26 44	$67,11.54	$14 14	$38,906 31	$91,588 02	$130,488 33	$3 23.1

Sizes.	Length.
Egg shaped, 2 feet 4 inches x 3 feet 8 inches	23,524.00
Egg shaped, 2 feet 0 inches x 3 feet 0 inches	13,547.83
Egg shaped, 1 foot 8 inches x 2 feet 6 inches	579.60
Circular, 3 feet 0 inches	2,491.60
Circular, 15 inches	242.00
Total	40,385.03

Average cost to the city per lineal foot..... $0.964

Average cost to property owners..... $2.267

Average cost per lineal foot.	
One lineal foot cost	$ 2.915
One lineal foot cost, including manholes	3.055
One lineal foot cost, including manholes, inspection	3.196
One lineal foot cost, including manholes, inspection, inlets	3.231
Each manhole cost	26.44
Each inlet cost	71.10

Summary of Main Sewers built during 1883.

TITLE OF SEWER.	Size.	Length.	Price per foot.	Cost to city.	Cost to property owners.	Inspection.	Total cost.	
From Delaware river to Laurel street...	4 feet.	533 feet.	$15 00	$13,481 46	$3,992 20	$526 66	$17,473 66	
CANAL STREET.....	2 ft. 4 ins. x 3 ft. 6 ins.	1,119 feet.	8 00					
MILL CREEK (on Forty-seventh street, Silverton to Aspen streets).....	15 feet.	774 feet.	44 75	33,296 19	1,340 31	486 66	35,123 16	
INTERCEPTING, Section 3 (Turtle rock to Girard avenue).....	4 feet 6 inches.	2,400 feet.	16 98	41,085 33	.....	333 33	41,085 33	
Amount.....	.....	4,826 feet.	.....	$87,862 98	$5,332 51	$1,346 65	$93,682 15	

Main Sewers in progress.

TITLE OF SEWER.	Size.	Length.	Price per foot.	Cost to city.	Cost to property owners.	Inspection.	Total cost.	Retained per cent.
YORK STREET (from Aramingo Canal to Coral street).....	3 ft. 4 ins. x 5 ft.	1,670 feet.	$9 44	$13,011 84	.....	$400 00	$16,164 80	$3,152 96
WEST COHOCKSINK (on Dauphin street, Nineteenth street to Sedgley avenue)...	.....	.....	.....	2,289 60	.....	.....	2,862 00	572 40
Amount.....	.....	1,670 feet.	.....	$15,301 44	.....	$400 00	$19,026 80	$3,725 36
Total.....	.....	6,496 feet.	.....	$103,651 08	$5,332 51	$1,746 65	$112,708 95	$3,725 36

ANNUAL REPORT

OF THE

CHIEF ENGINEER and SURVEYOR

OF THE

CITY OF PHILADELPHIA,

FOR THE YEAR 1884.

PHILADELPHIA:
DUNLAP & CLARKE, PRINTERS, HASTINGS' BUILDING, 819 & 821 FILBERT ST.
1885.

DEPARTMENT OF SURVEYS.

OFFICERS, 1884.

Chief Engineer and Surveyor,

SAMUEL L. SMEDLEY.

Principal Assistant Engineer,

J. MILTON TITLOW.

Assistant Engineer, J. KAY LITTLE. *Recording Clerk*, GEORGE STURGES.

Sewer Register, EDWARD H. THOMPSON.

Draftsmen.

William G. Walbridge, Carl A. Trik, George E. Datesman, William Calvert.

Rodman, J. Henry F. Dixon. *Messenger*, Isaac Holland.

REGISTRY BUREAU.

Registrar, JOHN H. DYE.

Search Clerks.

James W. Simmons, Richard B. Davis.

Draftsmen.

Jonathan Eggleton, William H. Wester, George H. Mercer, Henry C. Glenn, Francis Lightfoot, Henry C. Hamer.

Inspectors of Sewer Connections.

J. Sellers Kite, George F. Uber.

Sewer Inspectors.

Henry M. Smith, William Wilson, Charles Y. Landerbach, Benjamin E. Hooven, William Yetter, Abraham Ruth, George L. Deitz, James McGill, William May, Samuel H. Collom.

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR,

FOR THE YEAR 1884.

Philadelphia, March 19, 1885.

HON. WILLIAM B. SMITH,
Mayor of Philadelphia.

DEAR SIR:—I respectfully submit the following report of the Department of Surveys, for the year 1884.

The general appropriation made to the department on the 31st of December, 1883, was $48,920, of which $45,690.33 was expended, and $3,229.67 merged at the end of the year.

There was an additional appropriation made on the 3d of November, 1884, for the extension of a sewer on Sixteenth and Clearfield streets, the contract for which was not consummated until near the close of the year, and the money was not expended.

The engineering and construction of new sewers and bridges is supervised by this department, and payments made through the Highway Department, upon estimates of the Chief Engineer and Surveyor; as these appropriations have heretofore been made to the Highway Department, they are accounted for in the reports of expenditures by the Chief Commissioner of Highways.

The receipts during the year amounted to $8,631, of which $1,793 was received for 7,172 certificates of registry of real

estate; the return of the previous year was $1,903.75 for 7,215 certificates. For 1,547 permits to connect with sewers, $6,826.50 was received, as against $4,851.50 for 1,164 permits in 1884, an increase of $1,975. This is principally due to an extra charge of one dollar for each permit, to pay for inspection, which was formerly paid direct to inspectors, but now goes into the Treasury, and the two inspectors are paid monthly salaries by the city, which amounted this year to $2,200.

The Registrar reports 17,645 descriptions of transfers of real estate filed, making a total since 1865, of 370,670. From these descriptions 5,631 lots were plotted, making a total of 197,559, and 15,871 transfers were entered, making a total of 236,037.

During the year 1884, only four sectional plans of the revi sions of lines and grades were filed, covering an area of 1,304 acres. Councils have authorized the revision of a large number of plans, some of which are in progress, but the small amount appropriated for the year is insufficient to complete them.

The topographical survey has not progressed as it should; during the past year, only 2,945 acres have been mapped as against 3,851 acres of the previous year. The total area now mapped covers 24,636 acres. Authority has been given to survey 6,900 acres additional, which will cost about $10,350; for the year 1885, only $2,450 has been appropriated for this purpose.

As improvements extend into the suburbs, the owners of large tracts find it necessary to lay out and open intermediate streets, between principal thoroughfares located by the confirmed plans. The minimum width of these streets is thirty feet, in accordance with the ordinances of the city. The owners in nearly all cases, file a deed in this office, dedicating the ground to the city; where a deed cannot be obtained, provision is made either by ordinance or by the action of the

Board of Surveyors, to protect the city against the payment of damages for the opening of such small streets for individual benefit. During the past year, under ordinances of Councils, plans have been filed for 28 of these intermediate streets located in various parts of the city. There has also been filed, plans for the revision of the lines and grades of twelve special streets, and for striking two streets from the city plan.

The operations of the Registry Bureau are progressing as well as circumstances will permit; in the built-up portion of the city the changes in titles are recorded each day as filed at the close of the preceding day. The work of plotting the rural wards, the Twenty-first, Twenty-second, Twenty-third, and Twenty-seventh, is progressing but slowly, owing to the difficulties of locating properties. In many cases it is an impossibility to plot the descriptions as filed without first having a survey to locate them with reference to known points and established street lines; we are doing the best that we can under the difficulties, but the work that is done is not satisfactory. The appropriation for this work for a number of years past has been only $500; with such a small sum it is impossible to make much progress; this department asked for $1,500 for the year 1885, but Councils reduced it to the old figure, $500.

Bridges.

Market Street Bridge.

On the 7th of January, proposals were received for a permanent stone bridge, and a temporary wooden bridge over the Schuylkill river, at Market street, the lowest bids for each complete, were $1,000,000 and $55,000. City Councils not being prepared to appropriate so large an amount, the contracts were not awarded. Subsequently during the spring and summer, the tubes and tracks of the Philadelphia Traction Company were laid on Market street, east and west of the Schuylkill river. The company asked that the temporary

bridge be arranged so as to carry their tracks, they agreeing to pay $15,000 towards its construction. The designs were remodelled, proposals received July 7, and the contract awarded to the lowest bidders, R. A. Malone & Son, for $59,000, and the work commenced in August. At this time $31,680 has been paid them on account of work done, by the city, and $10,800 by the Philadelphia Traction Company. The bridge is located about 100 feet north of the present bridge, and consists of three wooden through Howe Truss spans about 425 feet in length across the river, resting on two piers in the river and two piers on the shores at the wharf lines; the approaches, about 350 feet in length, which extend from each end of the river spans to the permanent surface of Market street, are supported by trestles 16 feet apart, generally, with three longer spans of about 25 feet each, over the tracks of the Delaware extension of the Pennsylvania Railroad, on the west side. The trestles are also arranged for the location made for the proposed Schuylkill River East Side Railroad.

The roadways for the traction company and vehicles are each 20 feet wide in the clear, and the footway is 8 feet wide on the river spans and 11 feet on the approaches. The western approach extends over property of the Pennsylvania Railroad Company, which was leased from them for five years for $100 per year. Authority for locating the piers in the river was granted on November 3, by the Board of Port Wardens. The work will be completed in February, 1885.

South Street Bridge.

Proposals were received on March 24, for rebuilding about 430 feet of the west approach to South Street Bridge, of nine plate girder deck spans, 57 feet in width, and the contract awarded to the lowest bidders, Childs & Conklin, for $81,920. Work was commenced in April, by the erection of a temporary trestle bridge on the north side, 23 feet wide, to accommodate the street and passenger railway travel. They have been

paid $48,889.86 on account of work done; it will be completed about June, 1885. The foundation of one of the piers has been entirely rebuilt, and the rebuilding of another has been delayed by the necessity of shifting the tracks of the Delaware extension of the Pennsylvania Railroad; all the other piers were erected on the same site and on the old foundations, using the old pitched ashlar, and old skew backs for copings. There will be four lines of plate girders 49 feet in length, and 4½ feet in depth, suported by wrought iron columns, resting on new stone piers and old abutment piers. The roadway platform will be entirely of wrought iron, being formed of I beam transverse floor joists, covered with buckle plates riveted thereto. The roadway and footway formation will be made of Portland Cement concrete, with an intermediate layer of asphalt one inch in thickness, the roadway paved with granite blocks laid in Portland Cement, and the footway with Granolithic pavement.

Proposals for repairs to river spans of South Street Bridge were received December 28, 1883, and the contract awarded to Wm. B. M. Conklin, for $9,350. The repairs consisted in painting the ironwork of three truss spans and their cylindrical piers, renewing both footways, and a few other small matters. They were completed June 3, 1884.

Chestnut Street Bridge.

On March 24, proposals were also received for buttresses in the rear of west abutment of Chestnut Street Bridge, and the contract awarded to Anderson & Barr, the lowest bidders, for $53,500. The work was commenced in October, is now half finished, and $21,000 paid on account. It will be completed in March, 1885. These buttresses are four in number, 8 feet in diameter, and 64 feet in length, and are placed about 8 feet apart, parallel with the axis of the bridge and 45 degrees from a horizontal, for the purpose of transferring the horizontal thrust of the main spans, about 2,000 tons including the live load, to the rock. The piles under the abutments are

in a strata of river mud about 20 feet in thickness, and the toes rest in a sub-strata of very coarse gravel, cobble stones, and boulders, which have allowed of no vertical movement that we can detect, but the mud though apparently stiff enough to prevent side deflection of each pile from a dead load of about 20 tons each, is not sufficiently hard to offer adequate frictional resistance to its horizontal thrust. The buttresses are stepped into the abutment at their upper ends and into the rock at the lower ends, square with their direction. Each buttress is formed of wrought iron plates of 2 by 3 feet of half inch iron, around the edges of which are riveted angle irons forming flanges, which are bolted together as they are put in place, and the materials removed until they reach the full depth, when these clyinders are filled with concrete. The buttresses being entirely below high water mark and the arch in the rear of the abutment occupied by the double tracks and two sidings of the Delaware Extension of the Pennsylvania Railroad, allowed of no practicable space for open working from the surface, without cutting-off those tracks and entailing heavy damages on the city, and the necessity for maintaining the equilibrium in and around the present structure, made the use of compressed air absolutely necessary, by which the work could be done in detail and kept under control. Near the top of each buttress a connection is made by a temporary vertical wrought iron cylinder reaching to the surface, upon which is placed a double air-lock, close to the abutment. The concrete is made of one part best German Portland Cement, two parts bar sand and four parts broken stone, two inches diameter, put in continuously and rammed with only one intermission to allow the stepping into the abutment.

The work being new in design was considered to be difficult of construction, but with the great experience of the contractors, the workmen have now become so expert, that we expect to sink the last cylinder, fill and complete the buttress in one month's time.

Orthodox Street Bridge.

During 1883, this department prepared detail plans for iron swing bridge over the proposed new channel for Frankford creek at Orthodox street; proposals for the same were received this year, but two of the property owners on the old line of the creek, considered that they would be injured, commenced suit against the City for damages in which there were several legal points involved, causing such delay that it was concluded to rebuild the wooden swing bridge on the old site. A contract for this purpose was made with Sebastian Heim, on February 27, for $3,017, and the bridge was completed October 9.

Cresheim Creek Bridge.

The macadamizing of Germantown avenue at Cresheim creek, was delayed last year on account of the necessity of widening the avenue at that point, and the rebuilding and extension of the old bridge. The new bridge is located on the line of Cresheim avenue, as now laid out. The arch is of stone masonry 63° askew and has a clear span of 22 feet at right angles, and is 67½ feet long. The arch was completed at the end of the working season; the work will be continued next year.

The contract was made with Wolf & Dougherty, September 15, for $5,319.98, who have been paid $3,404.79 on account of work done.

Bridge at Second Street and Connecting Railroad.

The Pennsylvania Railroad Company desiring to avoid the grade crossing at Second street, began lowering the tracks last year, and constructed an over-grade temporary trestle bridge, to accommodate the street travel, while the proposed bridge and changes were in process of construction. A contract was made with William L. Ziegler, April 26, for a plate girder bridge for $12,000. The superstructure is 54 feet wide, 66½ feet clear span, and entirely of wrought iron except the floor, which is of oak.

Junction Railroad Retaining Wall.

Proposals were received on October 27, for rebuilding and extending the retaining wall on the west side of the Junction Railroad south of Walnut street, and a contract made with the Company, in which the City appropriated $5,000 towards its cost; the necessity for rebuilding being caused by a change of street grade on Thirty-second street at that point.

Manayunk Intercepting Sewer.

This is being constructed from Manayunk to Fairmount, to intercept the sewage and factory drainage along the east shore of the Schuylkill river, and is 4 feet 6 inches internal diameter.

The distance from the outlet to the Falls of Schuylkill is 19,000 feet, thence to the Wissahickon creek 5,000 feet, thence to the canal locks at Manayunk 5,000 feet, thence to the American Wood Pulp Company's works 6,000 feet, a total distance of 6¾ miles.

It is divided into sections, commencing with Section No. 1, Fairmount, and reaching No. 8 at the Falls of Schuylkill.

Section No. 1 commences at the outlet, 300 feet above Fairmount bridge, and 647.3 feet in tunnel is noted as Section 1 *a*, the remainder north of the tunnel as Section 1 *b*, extending nearly to Skating Club House, a distance of 1,698 feet. It was contracted for in 1883, but work had not progressed so that any payment could be made until 1884. It was completed on December 15, 1884. The tunnel costs $42.85 per foot, amounting to $27,736, and Section 1 *b*, 1,698 feet cost $15.90 per foot, amounting to $26,998.20.

Section No. 2 commencing at the Skating Club House, and extending to Girard Avenue Bridge, was contracted for and completed in 1883. The length being 2,400 feet, and the cost $16.98 per foot, amounted to $40,752.

Section No. 3, from Connecting Railroad to Columbia Bridge 3,978 feet, cost $9.49 per foot, amounting to $37,751.22, commenced May 16, and completed December 24, 1884.

Section No. 4, is 340 feet in tunnel at Columbia Bridge and cost $32.99 per foot, amounting to $11,216.60, was commenced and completed at the same time as No. 3.

Section No. 5, extends from Rockland steamboat landing to the Randolph Mansion, 3,500 feet, and cost $12.47 per foot, amounting to $43,645. It was commenced July 1, and completed December 31, 1884.

There is, therefore, 12,563 feet or two and three-eighths miles of sewer completed from Fairmont to Randolph's, at an average cost of $15 per foot, at a total cost of $188,100.

This is continuous excepting 804 feet at Section 6, at the tunnel on the East Park Drive, which was omitted this year in order that the Park travel should not be interrupted, until next year when it will become necessary to close it, while Sections 7 and 8 are being constructed along the river drive in front of Laurel Hill Cemetery. Proposals were received for these two latter sections on the twenty-third of December, the length being 5,800 feet, and the average price $9.00 per foot.

This sewer is made as near water-tight as practically possible by plastering the stone cradle or excavation with a heavy coat of cement mortar, and then laying the brick ring in two half brick courses, allowing each of them to set hard before the men are allowed to work on them; the inside of sewer to about 10 inches above springing line is finally plastered in two coats with Portland Cement Mortar, with a smooth finish in equal parts of sand and cement. The outside of the arch is also plastered to the springing line.

Dauphin Street Sewer.

The sewer on Dauphin street, from Nineteenth street to Sedgley avenue, was contracted for with McCafferty & Malloy on October 19, 1883; they were paid last year $2,289.60. Up to this time they have completed 1,487 feet of sewer, 8¼ feet in diameter, at $22,25 per foot, and 376½ feet of sewer, 7¾ feet in diameter, at $17.80 per foot, and have been paid

$31,829.96, of which $3,550.93 was paid by the property owners in assessment bills. The completion of this work has been delayed for the opening of Dauphin street, through a corner of Odd Fellow's Cemetery, which will not be accomplished until March next, when the work will be completed across the Connecting Railroad.

York Street Sewer.

An oval sewer, 5 feet vertical by 3 feet 4 inches horizontal, and 4,000 feet in length, from Coral street to Aramingo canal, was completed on the 23d of September, at a total cost of $41,020, of which $5,749.03 was paid by the property owners. It was built to relieve the Huntingdon street sewer, which was badly constructed and out of repair. Ten new manholes have been put in so as to gain access from the street surface, and 132 feet of the sewer had been torn out at Amber and Sergeant streets, and rebuilt at a cost of $2,155.50.

This sewer was built by the District of Kensington, before "Consolidation of the City," and is such a deplorable piece of workmanship that a greater part should be rebuilt.

Vienna Street Sewer.

This was an extension from Beach street to the Delaware river. One hundred and thirty-three and one-half feet were built at the cost of $1,500, and was completed on the twenty-fourth day of October. It is a wooden structure 4½ x 4½ feet, resting on two lines of piling, the sides of yellow pine and the bottom of 4 inch hemlock plank.

Broad Street Sewer.

A branch of the West Cohocksink sewer was built on Broad street, from Dauphin street to Lehigh avenue, with a branch sewer running eastward therefrom on Cumberland street. Between Dauphin and York streets the sewer is 5 feet circular diameter; from York to Cumberland 4½ feet, and from Cumberland to Huntingdon, oval, 2 feet 10 inches by 4 feet

3 inches; from Huntingdon to Lehigh avenue 2 feet 4 inches by 3 feet 6 inches, and the branch on Cumberland street east of Broad, 2 x 3 feet. The sewer is 25 feet deep at Dauphin street, 16 feet at York, and 19 feet at Cumberland street. The cost was as follows: 1,088 feet of circular sewer $12.43, 1,172 feet of oval at $6.49, and 265 feet of oval at $2.83, making a total of $21,880.07.

Sewer at Spring Garden Water Works.

The overflow from Pennsylvania avenue sewer which entered the old culvert constructed on the line of a natural stream, which formerly drained all the section now locally known as "Brewerytown," and near the Spring Garden forebay, heretofore enclosed by a wooden trunk, having for some years been considered a nuisance, was cleaned out, the wooden portion replaced by water-tight brick sewer 3 feet in diameter. It is intended to close all connections from the breweries, etc., and also the old sewer at Pennsylvania avenue, when there will be nothing but spring water passing through it, except upon excessive rains, when the Pennsylvania avenue sewer runs entirely full and the overflow will not be objectionable. Contract was made with M. C. Hong, December 17, and the work completed as far as possible December 31, at a cost of $2,358.79.

The thorough inspection of all sewer construction by skilled and careful mechanics, who are now well trained and required to remain on duty constantly while the work is going on, has resulted in a continued improvement in the character of workmanship and material, so that both main and branch sewers are models in this respect, and will compare favorably with any similar work elsewhere. The plans and specifications are faithfully regarded; more uniform and better quality of brick is used, and the standard of cement has been materially raised. Hydraulic cement and bar sand are used exclusively for mortar. A clause in the specification requires that the city must have the benefit of a proportionate reduction in cost, if sand suitable

for use is found in the trench and used. This has effectually relieved the department from the importunities of contractors to utilize such material, under the plea that it will make equally good mortar. While in some places, excellent sand may be found, the conditions vary so constantly that the utmost vigilance would not insure sufficient uniformity to guarantee first class work. The material now used makes the mortar hard as stone.

The experience of the city in laying terra cotta pipes has been so unsatisfactory in former years, when there was practically no inspection, in consequence of the breaking or choking of small drains, that very few have been laid compared with other cities. But the effects resulting from bad material, and want of uniformity in lines or grades, the chief cause of failure, can be overcome, now that Councils have provided continuous inspection; therefore the benefits to be derived from their efficiency and economy should now lead to a large increase in the use of drain pipes for small areas.

A large number of these, of twelve inches diameter, have been laid in the streets at private expense, and dead ends of sewers have been connected in many places, for the purpose of ventilation and circulation of air. The manholes in new branch sewers are generally 200 feet apart, and wherever the number is sufficient to give frequent ventilation so as to prevent concentration of sewer gas, they have open gratings for free communication with the air. When the concentration is so great as to emit offensive odors, the ventilators are closed.

Nearly all old sewers have an insufficient number of manholes for ventilation and access to the sewers, and it is very important that money should be appropriated to make these necessary additions throughout the city wherever there is a deficiency.

Branch Sewers and Inlets.

During the year, 48,367 feet of branch sewers have been built, with 274 manholes and 141 inlets, at a cost of $149,328.63, of which $109,049.87 has been paid by assess-

ment bills against property owners on the line of sewer, at the rate of $1.50 per foot except corner lots, and $40,278.76 has been paid by the city. The average cost of sewers has been $2.54 per foot, of manholes $25.89, and of Inlets, No. 2, $83.17; No. 3, $78.52. Inspection has amounted to $7,294.86, or 15 cents per foot. The average total cost being $3.08.

House Connections.

The sewers built during the last two years have been furnished with pipes for house attachments, and a record of these with their distance from the property line, kept in the office. Searching out the location of these pipes for the applicants has added much to the work of issuing licenses.

The number of attachments so located was 341, of which 319 were found without difficulty; of those missed it is proper to state that a considerable proportion was due to the want of time for re-arranging the records as they were returned by the Inspector at the time the sewers were constructed.

The pipes for house connections are 6 inches diameter, and connections with the sewers have been necessarily confined to that size; in older sewers, where the brick work has to be opened, permits for 8-inch connections may still be granted.

The great difference in each case of house drainage as to the grade, directness, quality of material and skill of labor, prevent the rigorous application of rules for proportioning the size of drains; the present practice is to allow six inch pipe for 12,000 square feet or less, 8-inch for 24,000 square feet, and 10 inches for one acre. In proportion as the supervision of the city is extended, will scientific rules become more applicable.

The Inspectors of sewer connections, J. Sellers Kite and George F. Uber, appointed under authority of the Ordinance of April 3, 1883, have been constantly on duty throughout the year; though nominally assigned to districts, they have been dispatched where the work was in readiness. Their activity and zeal have contributed greatly to the efficiency of the work.

The area covered extends from Snyder avenue on the south to Frankford, Germantown and Manayunk on the north, and westward to Fifty-second street.

Connections are made by carefully removing a sufficient portion of the sewer, and building in the pipe with Hydraulic cement, and wherever necessary, an extra wall is required to be placed about the pipe; connections with pipe sewer being made by taking out one length and inserting a T or Y branch of equal size.

The total number of connections inspected was 1,495, exclusive of those supervised by the men engaged in superintending the construction of sewers.

The receiving, entering, and filing of plans and records of sewers and drains, has been carried on at such times as the work of issuing licenses, furnishing information, etc., would permit; during the year, 91 plans of sewers have been received and recorded, and 22 of drains and sewers at private expense.

Much difficulty exists in securing prompt returns of the cost of drains and sewers authorized to be laid at private expense. The law imposes that duty upon the District Surveyors, but provides no method for insuring prompt returns from the proprietors. It is recommended that some regulation should be made respecting this matter.

Considerable time and labor are expended in furnishing information respecting sewers and drainage, which cannot appear in the number reported. The records of the connections returned by the sewer Inspectors, have been arranged and plans for indexing them devised; owing to the want of help, these records for the last six months are not readily available; their value cannot be over-estimated, and every effort should be made to render them easily accessible.

The sewer Inspectors have been engaged to some extent in carrying out the provisions of the Ordinance of March 8, 1867, concerning objectionable footway gutters; as their services are subject to call for their legitimate duties, only a limited number can be examined by them.

The work of abating these nuisances does not proceed satisfactorily under the present arrangement; the time allowed for compliance is too long; the city cannot enforce any joint action of the owners of alleys whence most of the complaints arise, for the want of which the more public spirited citizens must either incur expense for the advantage of their careless neighbors, or subject themselves to the annoyance of legal proceedings.

From the number of these complaints received it appears that the services of a competent person might be advantageously employed, for short periods at least, in examining and serving notices. Suitable legislation should be had empowering the department to have drains laid under the footway only, the cost to be assessed proportionately upon the property owners.

The security of sewer contractors is held for three years for keeping the new works in good order and repair. As sewers are now built, this might well be reduced to one year, for in that time the mortar is set and there are no defects likely to appear in the next two years, for which the contractor would be liable. The large amount of money which becomes bound up in that time, causes a load on competent bidders, and as in some cases they have to pay for the accommodation, this is taken into account in bidding and adds unnecessarily to the cost to the city.

Delaware River Survey.

The growth of the manufacturing interest along the Delaware river, above Bridesburg, has called for the privilege of building wharves, and as no wharf line has been established to limit the distance to which they may be permitted to extend into the river, a survey was ordered by City Councils, and $1,000 was appropriated to commence the work. The United States Coast and Geodetic Survey being in posession of superior facilities for making accurate and satisfactory work, both in triangulations and soundings of the river, application

was made to the superintendent, who accepted the invitation to proceed in the same manner and on the same terms, as the survey was made from the Schuylkill river to Frankford creek, in the year 1878.

As the maps are useful to the general Government, they contribute the services of their salaried officers and draftsmen, and the city pays for the subsistence and other attendant expenses. Eleven carefully selected stations on the Pennsylvania and New Jersey shores were occupied, and the angles required were measured, so that everything is in readiness for topography and hydrography, to be carried on during the coming year. Nine hundred and nine dollars and twenty-four cents of the appropriation was expended.

City Triangulation.

Mr. J. E. Hilgard, Superintendent, also assented to the application for the aid of his experienced assistants and superior and expensive instruments in making a complete triangulation of the city, and uniting the city surveys with the more accurate primary lines which have been measured and computed with such minute accuracy. This will enable the city standards to be computed and determined more absolutely than would otherwise be practicable, and true distances ascertained by United States Standard, between all portions of the city.

Thirty stations have been selected best adapted for the purpose in certain commanding positions in various directions; they will all be referred to Broad street as a base line, with a central station on the tower of City Hall. Signals have been put upon most of the points to be observed, preparatory to turning the angles after the first of the year. Five hundred dollars has been expended on this work, and in testing the accuracy of the district topographical surveys, before paying for the service of making them.

The work of engraving and printing maps of the city on the scale of 200 feet to the inch has been continued, and 200 each of four sets of maps 40x60 inches, showing the correct

record of block dimensions and curb elevations have been made this year, at a cost of $940. There are now eight sets of maps or sections complete.

Penn Square.

The work of paving and curbing around the City Hall was commenced in December, when it became necessary to carry out the details of adjusting the elevations to the requirements of the architecture of this immense building, as approved by the Board of Surveyors, in May, 1872, before the foundations of the structure were laid.

The old street paving and curb elevations varied on all sides of the Public Square, but the floor of the Public Buildings covering an area of 460 feet square, were necessarily level throughout the whole extent. Therefore, to readjust the curb heights so as not to vary too much from the floor elevations at the different entrances, and at the same time to furnish sufficient fall for street drainage, and to do this without causing damage to surrounding property of great value, was a difficult task. The curb at South Penn Square was 4.75 higher than the curb at Filbert street, and 4 feet higher than the curb at the east and west entrances on Market street.

The new curb on Market street was raised 1.5 higher, and the curb at the south entrance was lowered 1.8 feet, and the street graded out on a uniform slope to Chestnut street. The work has been accomplished so as to answer all requirements, and without any claims for damages consequent upon a change of grade.

The tables appended give detailed accounts of the length and cost of each sewer built, with appurtenances.

Respectfully submitted,

SAM'L L. SMEDLEY,

Chief Engineer and Surveyor.

Length and Cost of Sewers Built during 1884.

Location.	Size.	Length in feet.	Inlets.			Manholes.		Wells.		Per foot.	Total cost.	Inspector.	Contractor.
			Size No.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Cost each.				
Sixteenth street, from Valeria to Ridge avenue	3 ft. 0 in. x 2 ft. 0 in.	97	.....	.....	.....	1	$30 00	.....	.....	$2 30	$223 10	Geo. L. Dietz	F. P. Murray.
Forty-second street, from Myrtle to Hutton, thence to Palm	3 ft. 0 in. x 2 ft. 0 in.	784	2	3	$75 00	4	25 00	.....	.....	2 45	1,417 81	S. H. Collom	John Noonan.
Girard avenue, from Corinthian to South College avenues, thence to Poplar street	3 ft. 0 in. x 2 ft. 0 in.	1,653	2	3	75 00	9	27 50	.....	.....	2 33	4,323 99	B. E. Hooven	W. D. Stine.
Second street, from Race to Elfreth	3 ft. 6 in. x 2 ft. 4 in.	333.20	2	2	82 00	3	25 00	.....	.....	2 84	1,185 29	A. Ruth	B. McNichol.
Lancaster ave., from Forty-second to Holly street	3 ft. 6 in. x 2 ft. 4 in.	298.30	2	3	82 00	2	25 00	.....	.....	2 60	1,331 58	Jas. McGill	B. McNichol.
Eighth street, from Dudley to Mifflin streets, thence westward	3 ft. 6 in. x 2 ft. 4 in.	394.66	3 2	2 1	58 00 65 00	2	27 00	.....	.....	2 38	1,174 31	Jas. McGill	Thos. McCann.
Forty-second street, from Woodland to Chester avenues	3 ft. 0 in. x 2 ft. 0 in.	433.08	.....	.....	.....	2	29 00	.....	.....	2 63	1,197 01	Wm. May	H. C. Eyre.
Jefferson street, from Eighteenth to Bouvier	3 ft. 6 in. x 2 ft. 4 in.	154	2	1	78 00	1	30 44	.....	.....	2 00	416 44	Geo. Moore	F. P. Murray.
Preston st., from Ogden to Westminster	3 ft. 0 in. x 2 ft. 0 in.	344.50	2	1	65 00	2	27 00	.....	.....	2 25	894 12	Wm. Yetter	Thos. McCann.
Hancock st., from Berks to Norris.	3 ft. 0 in. x 2 ft. 0 in.	251.50	.....	.....	.....	2	22 00	.....	.....	2 43	655 14	Geo. L. Dietz	Thos. Murray.
Howard st., from Thompson st. to Girard avenue	3 ft. 0 in. x 2 ft. 0 in.	518	2	1	85 00	3	28 60	1	$90 00	2 51	1,554 00	John Abel, Jr.	W. H. Yoast.
Lancaster avenue, from Holly to Forty-first streets	3 ft. 0 in. x 2 ft. 0 in.	285.83	.....	.....	.....	2	25 00	.....	.....	2 50	764 58	Jas. McGill	B. McNichol.
Master street, from Seventh to Franklin	3 ft. 0 in. x 2 ft. 0 in.	181	.....	.....	.....	2	22 00	.....	.....	2 49	494 69	Geo. L. Deitz	Thos. Murray.
Parrish st., from Preston to Palm, thence to Westminster, thence to Holly	4 ft. 0 in. x 2 ft. 8 in.	1,470	2	6	90 00	7	28 60	.....	.....	4 90	7,939 00	C. Y. Lauderback. S. H. Collom	W. H. H. Achuff.
Oxford street, from Ridge avenue to Twenty-first street	3 ft. 0 in. x 2 ft. 0 in.	166	3	1	75 00	1	30 60	.....	.....	2 60	437 00	Geo. Moore	F. P. Murray.
Filbert st., from Sixth to Seventh	2 ft. 3 in. x 1 ft. 6 in.	235.25	.....	.....	.....	3	24 00	.....	.....	2 92	758 93	Jas. McGill	M. C. Houg.
Twentieth street, from Spring to Vine	3 ft. 0 in. x 2 ft. 0 in.	517.70	3	2	64 00	3	30 00	.....	.....	2 40	1,460 48	John Abel, Jr.	F. P. Deehan.

Length and Cost of Sewers Built during 1884—(Continued).

Location.	Size.	Length in feet.	Inlets. Size No.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wellh'les. No. built.	Wellh'les. Cost each.	Per foot.	Total cost.	Inspector.	Contractor.
Pine st., from Twelfth to Quince	3 ft. 0 in. x 2 ft. 0 in.	238.70	3	2	88 00	2	22 00	.....	.....	2 00	697 40	Jas. McGill	M. C. Hong.
Inquirer street, from Brown to Parrish	2 ft. 6 in. x 1 ft. 8 in.	362	3	1	60 00	3	20 00	.....	.....	2 25	934 50	John Abel, Jr.	F. P. Deehan.
Seventeenth street, from Ontario to Westmoreland	3 ft. 0 in. x 2 ft. 0 in.	544	.....	.....	.....	2	22 00	.....	.....	2 56	1,436 64	C. Jordan Wm. Yetter	Thos. Murray.
Second street, from Catharine to German, thence to Third	3 ft. 6 in. x 2 ft. 4 in.	864	2 3	2 1	90 00 87 00	5	25 00	.....	.....	2 33	2,405 12	Geo. Moore	S. Cox.
York street, from Ninth to Tenth	3 ft. 6 in. x 2 ft. 4 in.	450	2	2	79 00	3	39 00	.....	.....	2 27	1,296 50	S. Franklin	H. C. Eyre.
Bowman st., from Evans to Hancock	3 ft. 0 in. x 2 ft. 0 in.	808	3 2	1 2	70 00 75 00	5	20 00	.....	.....	2 45	2,299 60	E. Y. Shelmire	John Nolan.
Orthodox street, from Mulberry to Paul	3 ft. 6 in. x 2 ft. 4 in.	994.58	8 2	3 2	80 00 85 00	5	28 60	.....	.....	2 94	3,474 07	C. Breininger	W. H. Yoast.
Wood st., from Second to St. John	3 ft. 0 in. x 2 ft. 0 in.	228	2	1	80 00	1	30 00	.....	.....	2 50	680 00	M. McGrath	J. M. Mack.
Twenty-first street, from Market to Chestnut	3 ft. 0 in. x 2 ft. 0 in.	517	3	1	70 00	4	27 00	.....	.....	2 23	1,330 91	Wm. Yetter	Thos. McCann.
Page street, from Seventeenth to Eighteenth	3 ft. 0 in. x 2 ft. 0 in.	466	3	2	64 00	3	30 00	.....	.....	2 25	1,266 50	John Abel, Jr.	F. P. Deehan.
Diamond st., from Ninth to Tenth	3 ft. 0 in. x 2 ft. 0 in.	284	.....	.....	.....	2	27 00	1	50 00	2 45	799 80	S. H. Collom	J. McDonald.
Seybert st., from Twenty-second to Twenty-third	3 ft. 0 in. x 2 ft. 0 in.	434	3	1	65 00	2	50 00	.....	.....	1 95	961 30	B. E. Hooven	Geo. W. Hansell.
Sears street, from Sixth to Seventh	3 ft. 6 in. x 2 ft. 4 in.	427.50	3	2	80 00	3	25 00	.....	.....	2 42	1,269 55	M. McGrath	J. M. Mack.
Seventh street, from Barclay to Middle, thence eastward	3 ft. 0 in. x 2 ft. 0 in.	367.70	3	1	85 00	4	23 60	.....	.....	3 29	1,386 73	J. McGill	M. C. Hong.
Turner street, from Venango street to Erie avenue	3 ft. 0 in. x 2 ft. 0 in.	544	2	1	77 00	4	39 00	.....	.....	2 33	1,500 52	S. Franklin	H. C. Eyre.
Poplar st., from Canal to Fourth	3 ft. 0 in. x 2 ft. 0 in.	2,196	2	9	75 00	10	25 00	.....	.....	2 63	6,700 48	A. Ruth	T. P. Smart.
Lyceum avenue, Manayunk, to Pechin street	3 ft. 6 in. x 2 ft. 4 in.	516	2	2	95 00	3	28 00	.....	.....	3 73	2,183 68	C. Breininger	M. C. Hong.
Berks street, from Park avenue to Ontario street	3 ft. 0 in. x 2 ft. 0 in.	127	.....	.....	.....	1	24 00	.....	.....	2 27	312 29	C. Breininger	" "

Length and Cost of Sewers Built during 1884—(Continued).

Location.	Size.	Length in feet.	Inlets. Size No.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wellh'les. No. built.	Wellh'les. Cost each.	Per foot.	Total cost.	Inspector.	Contractor.
Eighteenth street, from Stiles to Cabot, and on Cabot street, from Eighteenth to Nineteenth	3 ft. 0 in. x 2 ft. 0 in.	506	3	3	92 00	3	20 00			2 10	1,398 60	B. E. Hooven	Geo. W. Hansel.
Sixteenth street, from Cambria to Clearfield	3 ft. 0 in. x 2 ft. 0 in.	1,010	2	2	79 00	6	27 00			2 25	2,592 50	S. Franklin	H. C. Eyre.
Master st., from Twenty-seventh to Thirtieth	3 ft. 6 in. x 2 ft. 4 in.	1,332	2	6	80 00	4	25 00			2 75	4,243 00	W. May	John Noonan.
Cambridge st., from Seventeenth street to Ridge avenue	3 ft. 0 in. x 2 ft. 0 in.	324				2	25 00			2 25	779 00	B. E. Hooven	Geo. W. Hansell.
Thirty-seventh st., from Mantua creek to Haverford street	3 ft. 6 in. x 2 ft. 4 in.	1,778.20	2	11	95 00	8	22 00	3	40 00	2 84	5,501 99	C. Jordan Wm. Yetter	B. McNichol.
Passyunk avenue, from Christian to German street	3 ft. 0 in. x 2 ft. 0 in.	779	2 3	3 2	95 00 85 00	6	23 00			2 23	2,330 17	Geo. Moore	M. C. Hong.
Fairhill street, south of Somerset street to Indiana avenue	3 ft. 0 in. x 2 ft. 0 in.	1,389	3 2	2 2	64 00 70 00	7	30 00	1	70 00	2 95	4,645 55	M. McGrath John Abel, Jr.	F. P. Deehan.
Hancock street, from Dauphin st. to Susquehanna avenue	3 ft. 0 in. x 2 ft. 0 in.	590.50				3	23 00			2 43	1,503 92		M. C. Hong.
Fairhill street, from Cumberland to Huntingdon	3 ft. 6 in. x 2 ft. 4 in.	557.50	2	2	85 00	3	27 00			2 61	1,706 08	Geo. L. Dietz	Geo. H. Miller.
Sixth street, from Columbia to Montgomery avenues	3 ft. 0 in. x 2 ft. 0 in.	557				2	27 00			2 79	1,608 03	S. Franklin	H. C. Eyre.
Seybert street, from Sixteenth to Seventeenth	3 ft. 0 in. x 2 ft. 0 in.	430	3	1	85 00	3	30 00			2 08	1,069 40	E. Y. Shelmire	F. P. Murray, Jr.
Fifth street, from Wood to Willow	3 ft. 0 in. x 2 ft. 0 in.	639.33	2	2	95 00	3	23 00			2 47	1,838 15	Jas. McGill	M. C. Hong.
Master street, from Twenty-fourth to Twenty-fifth, thence north on Twenty-fifth to Wright, and thence west	3 ft. 0 in. x 2 ft. 0 in.	1,054				3	23 00			2 23	2,419 42	C. Breininger	" "
Frankford avenue, from Huntingdon street to Lehigh avenue	3 ft. 6 in. x 2 ft. 4 in.	892	2	4	67 50	5	29 00			2 39	2,546 88	Geo. L. Dietz	H. C. Eyre.
Water st., from Vine to Callowhill	3 ft. 0 in. x 2 ft. 0 in.	641				3	25 00			2 74	1,831 34	Wm. Yetter	J. Kane.

Length and Cost of Sewers Built during 1884—(Continued).

Location.	Size.	Length in feet.	Inlets. Size No.	Inlets. No. built.	Inlets. Cost each.	Manholes. Wellh'les. No. built.	Cost each.	No. built.	Cost each.	Per foot.	Total cost.	Inspector.	Contractor.
Eighth street, from Cumberland to Huntingdon	3 ft. 6 in. x 2 ft. 4 in.	555	.....	.....	.....	3	25 00	.....	.....	2 32	1,362 50	.....	W. H. Yoast.
South College avenue, from Nineteenth to Twentieth street	3 ft. 0 in. x 2 ft. 0 in.	447	.....	.....	.....	3	27 00	.....	.....	2 21	1,068 87	E. Y. Shelmire	H. C. Eyre.
Thompson street, from Nineteenth street to Ridge avenue	3 ft. 0 in. x 2 ft. 0 in.	204	3	1	85 00	1	23 00	.....	.....	2 33	583 32	E. Y. Shelmire	M. C. Hong.
Germantown avenue, from Somerset to Huntingdon street	3 ft. 0 in. x 2 ft. 0 in.	1,196	2 3	6 1	95 00 85 00	5	25 00	.....	.....	2 93	4,284 28	B. E. Hooven	" "
Sixth street, from Erie avenue to Rising Sun lane	3 ft. 6 in. x 2 ft. 4 in.	415.66	2	1	79 00	2	27 00	.....	.....	2 93	1,350 90	S. Franklin	H. C. Eyre.
Columbia avenue, from Sixteenth to Sydenham streets	3 ft. 0 in. x 2 ft. 0 in.	233	3	1	85 00	1	23 00	.....	.....	2 19	618 27	E. Y. Shelmire	M. C. Hong.
Penn street, from Vine to South	3 ft. 0 in. x 2 ft. 0 in.	728.5	.....	.....	.....	5	24 00	.....	.....	2 53	1,963 10	A. Ruth	" "
Spring Garden st., from Franklin to Lorain	2 ft. 6 in. x 1 ft. 8 in.	136	.....	.....	.....	1	23 00	.....	.....	2 87	413 32	N. B. Beam	" "
Cherry street, from Twenty-first to Twenty-second	3 ft. 0 in. x 2 ft. 0 in.	448	3	3	95 00	3	25 00	.....	.....	2 12	1,309 76	C. P. McCally	R. McNichol.
Lawrence street, from York to Dauphin	3 ft. 0 in. x 2 ft. 0 in.	544	.....	.....	.....	4	25 00	.....	.....	2 20	1,296 80	Geo. L. Dietz	Geo. H. Miller.
Thompson street, from Twenty-fourth to Twenty-fifth	3 ft. 0 in. x 2 ft. 0 in.	468	.....	.....	.....	3	25 00	.....	.....	2 38	1,188 84	Wm. McCay	S. Cox.
Somerset st., from Fifth to Reese, and southward	3 ft. 0 in. x 2 ft. 0 in.	524	3	1	71 00	2	25 00	.....	.....	2 37	1,364 07	C. Breininger	W. H. Yoast.
Ridge avenue, Montgomery ave. to Twenty-fifth street	3 ft. 0 in. x 2 ft. 0 in.	616	.....	.....	.....	3	30 00	.....	.....	2 24	1,469 84	Jno. Currie	Jos. McDonald.
Saunders street, from Powelton avenue to Filbert street	2 ft. 3 in. x 1 ft. 6 in.	668	3	1	95 00	4	23 00	.....	.....	1 90	1,446 20	H. M. Smith	Jno. Noonan.
Cadwalader street, from Columbia avenue, north	3 ft. 6 in. x 2 ft. 4 in.	385	.....	.....	.....	3	29 00	.....	.....	3 00	1,242 00	Geo. L. Dietz	W. H. H. Achuff.
Hamilton st., from Thirty-seventh, eastward	2 ft. 3 in. x 1 ft. 6 in.	330	.....	.....	.....	2	24 00	.....	.....	2 00	708 00	H. M. Smith	Jno. Noonan.
Tenth st., from Wallace to Melon	3 ft. 0 in. x 2 ft. 0 in.	216	.....	.....	.....	2	23 00	.....	.....	2 73	635 68	N. B. Beam	M. C. Hong.

Length and Cost of Sewers Built during 1884—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manholes.		Wellh'les.			Total cost.	Inspector.	Contractor.
			Size No.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Cost each.	Per foot.			
Hope street, from Diamond street to Susquehanna avenue	3 ft. 0 in. x 2 ft. 0 in.	577	2	2	80 00	3	30 00			2 90	1,923 30	M. McGrath	Jno. M. Mack.
Waterloo st., from York to Davis	3 ft. 0 in. x 2 ft. 0 in.	948	2	3	80 00	7	30 00			2 90	3,199 20	M. McGrath	Jno. M. Mack.
Eighth street, from Passyunk ave. to Federal street	2 ft. 6 in. x 1 ft. 8 in.	401	2 3	1 3	80 00 75 00	3	23 00			2 22	1,264 22	C. R. Van Horn	Thos. McCann.
Twenty-second street, from Montgomery avenue to Berks street	3 ft. 0 in. x 2 ft. 0 in.	552				2	23 00			2 14	1,227 28	E. Y. Shelmire	M. C. Hong.
Seventh street, from Cumberland to Huntingdon	3 ft. 0 in. x 2 ft. 0 in.	568	2	2	76 00	4	24 50			2 29	1,550 72	C. Breininger	W. H. Yoast.
Twenty-second street, from Tioga to Venango, and thence to Twenty-third	3 ft. 0 in. x 2 ft. 0 in.	1,051	2	4	79 00	6	27 00			2 27	2,863 77	S. R. Franklin	H. C. Eyre.
Baring street, from Forty-first to Forty-second	3 ft. 0 in. x 2 ft. 0 in.	212				1	30 00			2 24	504 88	Jno. Currie	Jos. McDonald.
Fourth street, from Susquehanna avenue to Dauphin street	3 ft. 0 in. x 2 ft. 0 in.	594	2	3	90 00	4	23 00			2 22	1,680 68	Wm. May	M. C. Hong.
Fourth st., from Norris to Diamond	3 ft. 0 in. x 2 ft. 0 in.	552	2	1	90 00	4	23 00			2 23	1,412 96	Wm. May	" "
Broad st., from Locust to Sansom	3 ft. 0 in. x 2 ft. 0 in.	731.3				4	23 00	1	100 00	2 47	1,998 31	Jas. McGill	" "
Charlotte street, from Master to Thompson	3 ft. 0 in. x 2 ft. 0 in.	447				2	23 00			2 73	1,266 31	B. E. Hooven	" "
Third street, from Willow to Callowhill	3 ft. 0 in. x 2 ft. 0 in.	379				2	23 00			3 67	1,436 93	A. McGill	" "
Sansom street, from Seventeenth to Eighteenth	3 ft. 0 in. x 2 ft. 0 in.	452.5				3	23 00			2 69	1,286 23	Jas. McGill	" "
Bayard st., from Seventh to Eighth	3 ft. 0 in. x 2 ft. 0 in.	424.16	3	2	85 00	3	23 00			2 67	1,371 53	B. E. Hooven	" "
Story street, from Thirty-fifth, eastward	3 ft. 0 in. x 2 ft. 0 in.	152				1	23 00			2 43	392 86	Geo. L. Dietz	" "
Twenty-sixth street, from Jefferson to Wright	3 ft. 0 in. x 2 ft. 0 in.	155	3	1	85 00					2 23	430 65	E. Y. Shelmire C. Y. Lauderback	M. C. Hong.
Mather st., from Ontario to Tioga	3 ft. 0 in. x 2 ft. 0 in.	553	3	1	70 00	3	23 00			2 23	1,372 19	Geo. Moore	Jno. Nolan.
Mather st., from Tioga to Venango	3 ft. 0 in. x 2 ft. 0 in.	539	3	1	90 00	3	23 00			2 19	1,339 41	Geo. Moore	" "

Detailed statement of branch sewers built by the City during 1884.

Branch sewers.				Brick and stone inlets.			Manholes.			Wellholes.			Inspection.		Total cost, including all details.	Average cost per foot, including all details.
Length.		Excluding details.														
Feet.	Miles.	Total Cost.	Average cost per ft.	No. built, size.	Total cost.	Average cost each.	No. built.	Total cost.	Average cost each.	No. built.	Total cost.	Average cost each.	Total cost.	Cost per foot.		
48,367.15	9.160	$122,986 83	$2,543	No. 2, 97 No. 3, 44	$8,068 83 3,455 78	$83 17 78 52	274	$7,093 94	$25 89	7	$430	$61 43	$7,294 86	.15	$149,328 63	$3,087

Size.	Length in feet.	Average cost per foot excluding details.	Average cost per foot including manholes.	Average cost per foot including manholes and inlets.	Average cost per foot including all details.
Egg shaped, 4 feet 0 inches x 2 feet 8 inches	1,470.00	$4 90	$5 03	$5 40	$5 55
Egg shaped, 3 feet 6 inches x 2 feet 4 inches	10,347.60	2 63	2 77	3 16	3 31
Egg shaped, 3 feet 0 inches x 2 feet 0 inches	34,417.80	2 44	2 59	2 79	2 94
Egg shaped, 2 feet 6 inches x 1 foot 8 inches	899.00	2 33	2 50	2 90	3 05
Egg shaped, 2 feet 3 inches x 1 foot 6 inches	1,233.25	2 12	2 29	2 36	2 51
Total	48,367.15				

Intercepting Sewer in Fairmount Park.

4½ feet Diameter (circular)

Section.	Length.	Price per foot.	Cost per section.	Amount expended.	Commenced.	Finished.
1*a*	647.3	$42.85	$27,736 80	$27,736 80	Nov. 3, 1883.	December 6, 1884.
1*b*	1,698.0	15.90	26,998 20	20,800 80	April 28, 1884.	.....
2	2,400.0	16.98	40,752 00	40,752 00	June 22, 1883.	October 1, 1883.
3	3,978.0	9.49	37,751 22	29,608 80	May 16, 1884.	December 22, 1884.
4	340.0	32.99	11,216 60	7,210 24	May 16, 1884.	December 22, 1884.
5	3,500.0	12.47	43,645 00	33,519 36	July 1, 1884.	December 31, 1884.
Total.....	12,563.3	.....	$188,099 82	$159,628 00		
Amount expended in 1883.....				$40,752 00		
" " " 1884.....				118,876 00		
Total.....				$159,628 00		

Average cost per foot, $14.97.

Main Sewers.

Location.	Size.	Length.	Price per foot.	Cost.	Amount expended.	Assessment bills.
York street (from Aramingo Canal to Coral street)	3 ft. 4 ins. x 5 ft. 0 in.	*4,000 ft.	$9 44	$41,020 00	$41,020 00	$5,749 03
	6 ft.	38 ft.	20 00			
Broad street (from Dauphin street to Lehigh avenue, with branch on Cumberland street)	5 ft. / 4 ft. 6 ins.	1,088 ft.	12 43	21,880 07	17,504 06	3,139 18
	2 ft. 10 ins. x 4 ft. 3 ins. / 2 ft. 4 ins. x 3 ft. 6 ins.	1,172 ft.	6 49			
	2 ft. x 3 ft.	265 ft.	2 83			
Huntingdon street Sewer (on Sergeant street, northwest of Ambler, portion rebuilt.)	7 ft.	132 ft.	13 50	2,155 50	2,155 50	
		124½ manholes.	3 00			
West Cohocksink Sewer (on Dauphin street, from Nineteenth street to Sedgley avenue)	8 ft. x 3 ins.	1,487 ft.	22 25	30,787 45	31,829 96	3,550 93
	7 ft. x 9 ins.	376 ft. 5 ins.	17 80			
Forty-third street (Sansom street to Chestnut street, rebuilt)	4 ft.	54 ft.	.....	499 99	.....	
Vienna street (from Beach street to Delaware river, wooden sewer, square)	4 ft. 6 ins. x 4 ft. 6 ins.	183 ft. 5 ins.	.....	1,500 00	.....	
Total		8,796 ft.	.....	$106,843 01	$92,509 52	$12,439 14

* 1,670 feet built in 1883, and $12,611.84 expended in 1883.

Length and Sizes of Branch Sewers built in 1884.

	Egg-Shaped Sewers.					Circular.			Total length.
	4 ft. x 2 ft. 8 in.	3 ft. 6 in. x 2 ft. 4 in.	3 ft. x 2 ft.	2 ft. 6 in. x 1 ft. 8 in.	2 ft. 3 in. x 1 ft. 6 in.	3 ft.	15 ins.	12 ins.	
At public cost.....	1,470.	10,347.60	34,417.30	899.	1,233.25	582.	.....	2,118.80	51,067.75
At private cost.....	.....	.....	1,088.	.....	.....	.....	591.	6,791.35	8,470.35
Total.....	1,470.	10,347.60	35,505.30	899.	1,233.25	582.	591.	8,909.95	59,538.10

Total Length of Sewers built in 1884.

Description.	Feet.	Miles.
Main sewers.....	17,289.30	3.274
Branch sewers.....	51,067.75	9.672
Branch sewers, private cost.....	8,470.35	1.604
Total.....	76,827.40	14.550

Number of licenses issued to connect with sewers during 1884.

January	19	July	168
February	35	August	161
March	136	September	158
April	163	October	160
May	151	November	160
June	171	December	65
		Total	1,547

Tabular statement of connections with sewer made in each Ward during 1884.

Ward.	No.	Ward.	No.
First	30	Seventeenth	22
Second	16	Eighteenth	21
Third	26	Nineteenth	128
Fourth	14	Twentieth	71
Fifth	42	Twenty-first	14
Sixth	47	Twenty-second	29
Seventh	34	Twenty-third	5
Eighth	73	Twenty-fourth	168
Ninth	49	Twenty-fifth	32
Tenth	53	Twenty-sixth	14
Eleventh	17	Twenty-seventh	68
Twelfth	22	Twenty-eighth	141
Thirteenth	35	Twenty-ninth	176
Fourteenth	58	Thirtieth	15
Fifteenth	76	Thirty-first	39
Sixteenth	17	Fairmount Park	1
		Total	1,547

Table showing character of drainage during 1884.

Surface	858	Cellars	183
Water closets	1,563	Stables	18
Water privies	279	Miscellaneous	25
Sinks	440		

Bridges, 1884.

LOCATION OF BRIDGES.	Total cost.	Payments on account.	Cost of Inspection.	Contractor.	Inspector.
South street, repairing three river spans	$9,350 00	*$9,350 00	$210 00	W. B. M. Conklin	H. M. Smith, J. Abel, Jr.
South street, rebuilding west approach	81,920 00	48,889 86	500 00	Childs & Conklin	L. M. Winston.
Orthodox street, over Frankford creek, rebuilding draw	3,017 00	3,017 00	221 52	S. Heim	James Duffy.
Cresheim creek and Germantown avenue, rebuilding	5,319 98	3,404 79	311 85	Wolf & Dougherty.	James Duffy.
Total	$99,606 98	$64,661 63	$1,243 37		

* Estimates Nos. 3 and 4, final, amounting to $3,366, not yet paid, Controller refuses to approve.

ANNUAL REPORT

OF THE

CHIEF ENGINEER and SURVEYOR

OF THE

CITY OF PHILADELPHIA,

FOR THE YEAR 1885.

SAMUEL L. SMEDLEY,
Chief Engineer and Surveyor.

PHILADELPHIA:
DUNLAP & CLARKE, PRINTERS AND BINDERS, 819-21 FILBERT STREET.
1886.

DEPARTMENT OF SURVEYS.

OFFICERS, 1885.

Chief Engineer and Surveyor,
SAMUEL L. SMEDLEY.

Principal Assistant Engineer,
J. MILTON TITLOW.

Assistant Engineer, J. KAY LITTLE. *Recording Clerk,* GEORGE STURGES.

Sewer Register, EDWARD H. THOMPSON.
Sewer Clerk, WILLIAM CALVERT.

Draftsmen.
William G. Walbridge, Carl A. Trik, George E. Datesman.
Rodman, J. Henry F. Dixon. *Messenger,* Isaac Holland.

REGISTRY BUREAU.

Registrar, JOHN H. DYE.

Search Clerk, James W. Simmons. *Registry Clerk,* Richard B. Davis.

Draftsmen.
Jonathan Eggleton, William H. Wester, George H. Mercer,
Henry C. Glenn, Francis Lightfoot, Henry C. Hamer.

Inspectors of Sewer Connections.
J. Sellers Kite, George F. Uber.

Inspectors of Sewer Construction.
Henry M. Smith, William Wilson, Charles Y. Lauderbach, Benjamin E. Hooven, William Yetter, Abraham Ruth, George L. Deitz, James McGill, William May, John Abel, Jr., S. R. Franklin, James Duffy, George Moore, Newton B. Beam, C. P. McCally, C. R. Van Horn, Findley J. Watt, Joel P. Colebaugh.

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR,

FOR THE YEAR 1885.

Philadelphia, January, 1886.

HON. WILLIAM B. SMITH,
Mayor of Philadelphia,

DEAR SIR:—I present herewith a statement of the receipts and expenditures and a report of the work done in the Department of Surveys during the year 1885:

The General Appropriation under Ordinance of December 31, 1884, was	$339,870
By Ordinance of February 3, 1885, transfers were made from Item 9, $25,000; from Item 30, $25,000; by Ordinance of December 18, 1885, from Item 30½, $1,500, and Item 33, $4,000; total reduction, ...	55,500
Leaving	$284,370
There was added by Ordinance to Item 31, $2,000; by Ordinance November 11, 1885, $3,000, and by Ordinance of December 18, 1885, $5,087.38, making .	10,087.38
Total amount appropriated during the year .	$294,457.38
Expended during the year, $204,944.91; balances transferred to the year 1886, $81,795.65; balance which merged, $7,836.77; making, ...	$294,457.38

The receipts of the Department from various sources amounted to $14,628.94, an increase of $5,997.94 over last year; $9,409 were received for permits, $1,987 for certificates and searches in Registry Bureau, $3,223.94 from sewer bills collected and in balancing estimates, and $9 from miscellaneous accounts.

Registry Bureau.

The records show considerable increase in the receipts and amount of work done in this bureau during the year; 7,948 certificates of search have been make out, for which $1,990.50 have been received, an increase of $196. During the year 19,681 descriptions have been received, making the number now filed 407,996, an increase of 2,036.

Transfers of property titles entered in 1885, 17,561; increase, 1,700; total, 253,588.

Lots plotted in 1885, 6,854; increase, 1,223; total, 204,413.

Total entries for 1885, 24,415, an increase of 2,923 over 1884.

In addition to keeping up the daily entries of lots sold and transferred in the built-up portion of the city heretofore plotted, a greater advance has been made than heretofore in plotting the rural districts.

The value of this work to the Assessors and Board of Revision of Taxes is very great, and it is more and more appreciated by the general public, as is shown by the numbers who daily visit the office in search for information as to the ownership of properties. The first cost of the 120 large books of entry is greatly enhanced by the years of work and plotting and recording which they contain, so that their preservation from wear and destruction is a matter of great importance. It has, therefore, become advisable to guard against the abuse of the free use and privilege of examination granted by ordinance to conveyancers, lawyers and interested property owners—some parties have sent boys with long lists of proper-

ties to find the names of owners with the intent of disposing of the information for speculative purposes, or of selling it to storekeepers as an index to the standing of customers desiring credit.

After twenty-one years of practical test of the details of the system of Registry, it is gratifying to be able to assert that no material change in the original design has been called for, and while criticism has been invited and suggestions for improvements from those who make constant use of the books, none have been offered. It has certainly been a great success and an acknowledged improvement over the systems that were in use in various cities previous to its adoption here. The percentage of errors has been very small, and those which have been discovered and corrected have nearly all been caused by defective information furnished by property owners themselves or their agents in the first year of the existence of the Bureau.

The Act of Assembly under which the Registry Bureau was organized, requires that descriptions of property returned by the owners thereof shall be arranged and filed alphabetically. There are over 400,000 of these descriptions, which have been so arranged and should be filed in cases so that any original paper could be obtained for comparison or examination in a few minutes, but this is impossible at the present time because the facilities for storing them are so inadequate.

The mezzanine rooms in the City Hall over the General Office, has been designated for storage and filing of plans and papers, a great many of which are temporarily packed away in boxes and closets removed from the old office on Fifth street. A complete set of cases and drawers are required, but the Building Commission has not responded to the request to have the rooms fitted up and cases made, and the City Controller has refused to pay bills for the same if paid out of the Department funds. That this work should be done speedily is apparent, as many valuable papers are being injured by dust, or destroyed by mice; and also on account of the need

of having them in such order that they can always be readily and speedily referred to.

City Plans and Surveys.

There were no original sectional plans filed during the year. This class of work, which is done by the District Surveyors, has been limited to the revision of old plans, amounting to an area of 878 acres. The appropriation for this purpose was divided up into such small sums, and so widely distributed, that the plans are but partly done and await future appropriations for completion and filing.

There were 1,315 acres of topographical surveys added, making the total area 25,951 acres.

The insufficiency of the width of many of the old streets of the city is apparent in many places, where the great value of improvements fronting on them makes the experiment of increasing their capacity enormously expensive.

An Act of Assembly was passed April 28, 1870, widening Chestnut street 5 feet on the south side, and on March 31, 1884, an Ordinance passed Councils to increase the width 5 feet on the north side, making it 60 feet wide on the city plan. This width was confirmed by the Board of Surveyors on the 2d of March, 1885, so that the buildings hereafter to be erected will have to recede to the new line.

The Board of Surveyors has also recommended that the line of Arch street west of Eighth street should be established so as to increase its width from 66 feet to 72 feet. This need not be attended with very great expense, because most of the buildings have been erected so as to recede to that extent.

The Board has also recommended that Columbia avenue, now 60 feet wide, should be made 100 feet wide, because it is so situated that it will become one of the most important thoroughfares leading to the Park. There are only four houses erected on the north side from Twenty-fifth street to Thirty-third street, therefore a grand avenue might be secured at but little more cost than the land damages.

They have also recommended that Oxford street should be widened to 80 feet between Twenty-eighth and Thirtieth street where no houses have as yet been built.

The growth of the city to the westward and northward has created a demand for room to deposit surplus earth from cellar excavations and other work, so that the grades of many streets can be elevated and improved without heavy cost and the filling of the intermediate vacant ground also. This is particularly the case in the vicinity of the Park, where old valleys can be filled up and good grades established on Park approaches. A complete plan for filling up Thirty-third street from Girard avenue to Columbia avenue, and carrying it over the Reading and Connecting Railroads by bridges, affording a safe and convenient entrance into the East Park, and also for public travel; it has never been acted upon favorably by Councils, although presented for consideration several years ago. The public convenience demands that it should be acted upon as soon as practicable.

Several of the buildings having been destroyed by fire at the east end of Chestnut street bridge, the opportunity was embraced for revising the city plan so as to make a lighter grade on the bridge approach. The grades on Walnut street, in the vicinity of the Schuylkill river, should be adjusted for easy bridge approaches before being further interfered with by the erection of buildings.

The revision of the grade of Market street, from Thirtieth to Thirty-second streets, has been such an improvement to that great thoroughfare that this work should be continued by raising the grade at Twenty-third street six or eight feet, so that the grade on the east approach will not be greater than the revised grade to the westward.

The Board of Surveyors has approved several important changes in the elevation of streets authorized by Councils to avoid grade crossings of railroads along the line of the Philadelphia and West Chester Railroad, at Sixth street and Connecting Railroad, at Church Street Station, Frankford, and at other points.

The Baltimore and Philadelphia Railroad and the Schuylkill River East Side Railroad were authorized by Ordinance of Councils to proceed with the construction of their road on the 3d of July, 1885. The determined efforts of the companies to enter and pass through the city regardless of the dangers of grade crossings, were abandoned after the feasibility of dispensing with many of them in the Twenty-seventh and Twenty-sixth wards had been fully demonstrated by the Chief Engineer and Surveyor, and expensive bridges at Gray's avenue and Woodland avenue, Wharton street and Gray's Ferry road are now being built, which will avoid the terrible dangers to which citizens and travelers at such crossings are perpetually liable.

The plan submitted and advocated by the Chief Engineer and Surveyor for a tunnel in Twenty-fifth street and Pennsylvania avenue, whereby the whole freight and rapid passenger travel of the new line can be brought nearly to the heart of the city, without in the least interfering with the safety or appearance of the approaches to the Park in the vicinity of Green street and Fairmount avenue, was also adopted after much discussion by Councils and the committees. The legal barrier to any entrance by railroads within the Park limits, which at first was thought to be insurmountable, was removed when the fact was established that ground sufficient for a necessary curve at Twenty-fifth street and Pennsylvania avenue was held in fee by the City of Philadelphia and independent of Park Laws. When the tunnel. which is thirty feet below the street at this point, is completed, this space will be covered with earth and replanted, leaving no surface indications of the railroad, and its traffic constantly passing beneath.

We may confidently hope that this arrangement will demonstrate the feasibility and necessity for similar treatment of the Philadelphia and Reading Railroad on Pennsylvania avenue, whereby this approach to the Park can be made safe and attractive.

Bridges.

Rebuilding West Approach of South Street Bridge.

This important work, furnishing a safe means of communication between populous portions of the city, is now completed. After the usual delays caused by continuing the work during the winter months, which has proved very unsatisfactory, no better progress was made by the contractor in the spring; the work proceeded very slowly, in spite of the constant urging of this department for the adoption of more vigorous measures for its completion.

The work came to a standstill on the 27th of June in consequence of the financial embarrassment of the contractor. The Chief Commissioner of Highways was notified. He advertised for proposals to complete the work, and on July 28th, 1885, a contract was entered into by H. G. Clement to complete the old contract for the sum of $7,025. On July 30th the steel rails for the Lombard and South Streets Passenger Railway Company's tracks, which had been delivered upon the roadway of the bridge by the former contractors without the freight charges being paid, were removed by parties said to be in the employ of the Pennsylvania Railroad Company for the purpose of securing said charges.

The loss of the rails caused further delay and complications between the contractor, H. G. Clement, and the city. These were finally adjusted, and work was recommenced August 20th, and it proceeded slowly until completion, December 12th, 1885.

Brayton's patent girder rail of steel, now used on a number of the street railways in the City of Providence, was laid on this bridge as an experiment. The rail is T in section, and has a depth of seven inches, weighs 56 pounds to the yard. In laying, it is placed in chairs of cast-iron 24 inches long and 8½ inches wide. These are set 7½ feet apart on foundations of concrete. These chairs have grooves cast in them larger than the bottom of the rail, into these iron wedges are

driven, holding the rails in vertical position; iron tie rods inserted through the stem of the rail, with nuts on both sides, keep the lines in position horizontally; the whole is kept rigid and firm by the pavement.

On this portion of the South street bridge the joints of the granite block pavement were filled with Portland cement grout, and the blocks laid so as to fit snugly against the rails, the heads of rails and surface of blocks being at the same elevation; the corners of the latter next the inner side of the former were chipped off to give space for the flange of the car-wheel.

The advantages claimed for these rails are, that having no trams, wagon traffic will not seek them, and they can be crossed with great ease, and as no wood or other perishable material is used, the cost for repairs and maintenance is lessened.

The following estimates were made in 1885 on account of work:

To Messrs. Child & Conklin, ...	$13,434 88
To H. G. Clement, ...	5,620 00
Total, ...	$19,054 88

The cost of inspection is chargeable to the contractors, and $323.10 is due on this account.

Cresheim Creek Bridge on Germantown Avenue.

This work was continued in favorable weather during the winter, and completed on May 16th, 1885.

Estimates were made during the year amounting to $1,732.95.

Fountain Street Bridge, Manayunk.

This bridge is situated on the line of Fountain street, and spans the canal of the Schuylkill Navigation Company.

It consists of two wrought iron quadrangular trusses, with inclined end posts. The trusses are 18 feet apart; the trans-

verse floor beams are five 15-inch I beams suspended from the panel points of the trusses; upon these are laid seven longitudinal 9-inch channel beams extending twelve inches over the back walls of the abutments.

The old wooden superstructure was removed, the parapet walls rebuilt and the old abutments raised and repaired to the extent rendered necessary by the new work.

Contractors, the "King Iron Bridge Manufacturing Company," of Cleveland, Ohio.

Contract price, $3,188.

Work commenced September 1, 1885, finished September 28, 1885.

Sewer Construction.

All sewers, whether of brick or pipe, built at private expense, were inspected, as required by the resolution of the Committee on Surveys of May 1, 1883, at the cost of the parties laying the same.

The Ordinance of the Select and Common Councils, approved the 5th day of April A. D., 1884, provides "that the building of all new sewers, drains and inlets shall be under control, supervision and management of the Chief Engineer and Surveyor, and that the appropriation for the same shall be made to the Department of Surveys, and that warrants for said work shall be drawn by the Chief Engineer and Surveyor and he shall advertise for the same and award contracts as provided by law." Previous to the passage of this Ordinance all appropriations for works of sewerage were made to the Department of Highways.

Although this Ordinance was passed in April, 1884, yet its provisions were not carried into effect until January 1, 1885, for the reason that the appropriation for sewers and inlets for the year 1884 was made to the Highway Department, and to have placed these items to the credit of the Survey Department would have required legislation which was deemed inadvisable, and in addition to this, some sewers were advertised by the Chief Commissioner of Highways as early as the 28th

day of February, 1884, or prior to the date of the Ordinance quoted.

Main Sewers.

5,843.46 linear feet of main sewers were built in various parts of the city, several were uncompleted at the end of the year and work will be continued in the spring. A brief account of each is given below:

Dauphin street sewer, from Nineteenth street to Sedgley avenue, has been completed to the west line of Twenty-fourth street; this is as far as it can be built for the reason that the appropriation has been exhausted. The work of this sewer was commenced in 1883, continued in 1884 and finished in 1885.

The Pennsylvania Railroad Company objected to the building of the sewer under their roadway unless the contractor would file a bond indemnifying the company against accidents of every kind, and further, that the work should be done by and under the direction of the company at the expense of the contractors. After correspondence and delays incident thereto, in the belief that the city had a right to perform the work, using all needful precautions for safety, the contractors were directed to go ahead with the construction, which they did successfully, without any further interference from the company.

Dauphin street sewer, from Twenty-fourth street to Sedgley avenue, including curve to connect the sewers at Sedgley avenue and Susquehanna avenue, has been contracted for at $19.50 per foot. Its completion will be of great benefit to that part of the Twenty-eighth ward in which it is situated; the main sewer on Sedgley avenue having no outlet, it is necessary to carry all the sewage discharged by the Susquehanna avenue sewer into a small stream, where it becomes a positive nuisance from the refuse matter of slaughter houses being discharged into it. The completion of this sewer will carry to the outlet this offensive matter under cover, but the pollution

should be removed at its source and not be permitted to enter the sewers.

Clearfield street sewer across Sixteenth street. The sewer was built at this point to replace a wooden trunk which carried the creek under Sixteenth street; it connects with one already built in Clearfield street east of Sixteenth street and extends a short distance west of Sixteenth street.

Clearfield street sewer, from Broad to Thirteenth street, takes the place of the creek; its completion allows contemplated improvements to be made and removes the nuisance which existed at Broad street and rendered the properties in the vicinity undesirable as residences. We have now on the line of Clearfield street a continuous sewer from Thirteenth to Sixteenth street.

Snyder avenue sewer has been extended from Thirteenth street to Sixteenth street, where it will be connected with the Sixteenth street sewer by means of a chamber 20 feet long. Inlets were built at Broad street and Sixteenth street, besides manholes and ventilators.

Sixteenth street sewer extends from Snyder avenue to a point 188 feet north of Mifflin street. It has two chambers, one at Snyder avenue, the other at Mifflin street; two inlets at Passyunk road, two at McKean street, and four at Mifflin street, and two manholes and three ventilators.

The chamber at Mifflin street furnishes a connection for the sewer to be constructed on Mifflin street west of Sixteenth street. It is 15 feet long.

The chamber at Snyder avenue, which connects the Sixteenth street and Snyder avenue sewers deserves special attention; the sewage which flows through Sixteenth street sewer is turned by means of a weir 18 inches high, built in the chamber, into the Snyder avenue sewer, and thence into the Delaware river; in case of a heavy rain-fall the increased volume of water will pass over the weir, through the chamber, into the stream beyond, and thence into the river.

When this sewer and its connections are extended it will

relieve that section north of Snyder avenue and west of Sixteenth street. Considerable relief will be afforded at the present time to the over-charged Snyder avenue sewer by means of this chamber; all the back water will be discharged into it, and thence into the stream leading to the Delaware river.

The contract for extending the Mill Creek sewer, on Meadow and Sansom streets from Forty-sixth street to Chesnut street has been contracted for at $49.99 per foot. Considerable delay was experienced in getting the matter of securities adjusted. Finally, October 14, 1885, work was commenced and continued until the close of the year, when the length of completed sewer was 158 feet. The total length to be built under this contract will be 388 feet of a diameter of 20 feet.

Sewer on Annsbury street, extending across Fifth street, is nearly completed. The work, although called a sewer, is really an arched bridge, spanning the Wingohocking Creek; it is built of Conshohocken stone, has a span of 24 feet, and a rise of 15¼ feet, with four wing walls, each 23 33-100 feet long.

The foundations are six feet deep below the water line, and seven feet six inches thick at the bottom; the ring stones are of Hummelstown brown stone; length 104 feet; contract price $7,686.

Twenty-fourth street sewer, from Dauphin street to York street, was commenced September 23, 1885, and at the end of the year 300 feet had been completed. It is the intention to extend this sewer as far north as Huntingdon street, where it will connect with the sewer at that point. When this is done West Cohocksink Creek will cease to exist, as all the water will be diverted from the old course into sewers located in city streets.

Lombard street sewer was built from a point 108 feet east of Seventh street to 122 feet west of Eighth street, a distance of 726 feet, with seven inlets, two well-holes, two man-holes, and one ventilator, at a cost of $12,937.32.

Branch Sewers.

62,534.77 linear feet of egg-shaped sewers of brick, varying in size from three feet six inches vertical diameter and two feet

four inches horizontal diameter to two feet three inches vertical diameter by one foot six inches horizontal diameter, and

The brick sewers were generally built with a ring of four 9,212.37 linear feet of terra-cotta pipe sewers of 12 and 15 inches diameter, were laid during the year.
inches, or one course thick, laid in natural cement mortar, of the proportion of two of sand and one of cement. Where the nature of the ground required it additional brick or stone work was put in, so as to render the work substantial, solid, and enduring.

The terra cotta pipes were laid in a bed of concrete six inches thick around the bottom and sides of the pipe. The concrete was composed of natural cement mortar, same proportion as for brick sewers, and three parts of broken stone or screenings from the gravel pits.

Slants.

Slants were walled in the brick sewers at distances not exceeding 15 feet, on pipe sewers, taps or hubs moulded on the pipes, were placed at the same distances, so that it will not be necessary to break either a pipe or a brick sewer to make a connection for house or other drainage.

These slants are six inches in diameter, but by application of property owners larger pipes were inserted while the sewer was being constructed, if the area to be drained demanded it. Slants have also been put in for future inlet connections. About 5,000 slants have been inserted in branch sewers.

Manholes.

Manholes were built on an average of one manhole for every 165 feet of sewer, generally they are at a distance of 200 feet on brick sewers and 100 feet on pipe sewers; the walls are nine inches thick and are started from the springing line of the sewer, at which point the manholes are three feet long and as wide as the sewer. At one point of the wall it is carried up plumb, at all other points it is gathered into a circle

two feet in diameter at the surface of the street; the cover is of cast-iron, weighing 275 pounds, with openings in the lids for ventilation. When these ventilating lids are found objectionable galvanized plates are bolted to them, thus preventing the gases from mingling with the atmosphere. Galvanized wrought-iron ladder bars are placed at intervals of eighteen inches, allowing of an easy mode of ingress and egress. The average cost of manholes was $24.13 each.

Wellholes.

Where connections have been made with sewers of great depths, wellholes are built; they are generally four feet in diameter with walls thirteen inches thick, laid in Portland cement; drip-stones are placed at intervals of five feet and alternate in position so as to break the fall of sewage.

Number built, seven; average cost of each, $67.46, or $4.75 per vertical foot. Total cost, $472.25.

Inspection.

The high standard heretofore adopted for all work done under the direction of this Department has been faithfully adhered to; the specifications are very explicit and comprehensive, and the results obtained cannot be otherwise than beneficial to the City at large.

Our methods of inspection require the presence of an inspector *at all times* when work is being performed, whether day or night; his duty is to see that only proper materials and workmanship are incorporated into the structures, and after completion, to make an affidavit that the work has been done in every respect in strict accordance with the plans, specifications and contract.

The Inspectors are men selected by reason of their peculiar fitness for the position, of ripe experience and good judgment, fully capable of giving practical instructions to the mechanics employed and possessing the necessary firmness to see that all directions of the Engineer relating to materials or workmanship are carried into effect.

The character of materials used during the year was first-class; inferior bricks were condemned and removed from the line of the work and a better class substituted. In all cases the bricks have been culled, under the direction of the Inspectors, by men furnished by and at the expense of the contractors.

It is well understood by the contractors that poor materials and workmanship are not allowed in public work built under the direction of this Department.

The cost of inspection for each lineal foot of branch sewers, including manholes, inlets and wellholes for 1885 was 13 cents against 15 cents for 1884, a reduction of two cents per foot.

Inspectors, when actually engaged in the work, are paid at the rate of $100 per month.

Cement.

The natural cements used during the year were the "Improved Union, manufactured by the American Cement Company at Egypt, Penna., and the "Improved Anchor," manufactured by the Coplay Cement Company, at Coplay, Penna:

These cements have given a very high test and the breakages show very little difference in their tensile strength. Many tests of each were made, the average being as follows:

Brand.	Age in Air.	Age in Water.	Tensile Strength of One Sq. In. Sect.
Improved Union.....	30 Min.	24 Hrs.	63.13 Lbs.
Improved Anchor.....	30 "	24 "	61.09 "

Portland cements used included "Saylor's," "Dykerhoff's," "Fewer," "K. B. & S." and "Giant," the first and last being of American manufacture, the others imported.

All tests are made of briquettes of one inch section instead of two and a quarter as used last year; the results of using the former are shown in the higher tests. The quality of the cement has been improved also.

Cost of Branch Sewers.

The average cost of branch sewers, including all details, was $2.08 per lineal foot, against $2.54 for 1884, and including all details, $2.57 for 1885 against $3.08 for 1884, a difference of 51 cents per lineal foot. This can be accounted for in a measure by the fact that about 9,000 feet of pipe sewers enter into the calculation for 1885, but excluding these we still have $2.19 against $2.54 and $2.62 against $3.08, showing conclusively that the cost per lineal foot of brick sewers has been greatly reduced during 1885, notwithstanding the high standard of work is still maintained.

The average cost of smallest size brick sewer, 1 foot 6 inches by 2 feet 3 inches, without details, was $2.07 per foot, while that of the next larger was $2.05 per lineal foot. The small sewers are built in narrow tramway streets, where there is little room to place the bricks and materials required for the work. The mortar has to be made in the adjacent street and wheeled a great distance; the curbs have to be re-set, etc., thus increasing the cost above what it would be on wider streets.

Inlets.

The amount expended under the inlet contract was $6,976.97.

These inlets were inspected by Abraham Ruth and Christian Breininger. Total cost of inspection $695, or $7.81 each.

One hundred and eighty-nine inlets were built in connection with the branch sewers, of the following sizes: 3 of No. 1, 53 of No. 2, and 133 of No. 3; average cost of each, for No. 1, $95; for No. 2, $87.58; for No. 3, $75.14. Amount expended $10,474.34. One inlet was put in for every 400 feet of sewer built.

Sewers Built at Private Expense.

Nine hundred and eight feet of oval sewers of brick, and 6,499 feet of pipe sewers were laid at private expense during the year. All were inspected in the same manner as the public sewers, slants inserted for house connections, and manholes built where necessary.

Sewer Bills.

When the amount of the assessment bills exceeds the cost of the sewer the excess bills are stamped payable at the Survey Department, served upon the owners of the property, and if not paid within thirty days from the date of service they are returned to the Law Department for collection and lien. A record is kept of each bill in a book prepared for the purpose.

Inspectors of House Connections.

Inspectors of sewer connections have been on duty continuously during the year. During the busier season they have been materially assisted by the regular inspectors on sewers, who have superintended such connections as were made to the sewers while under construction.

All possible facilities and encouragement have been given to such property owners as proposed to connect their houses while the sewers were being built. Such a practice is of benefit to the city, as it prevents frequent and unnecessary opening of the streets, and the plan adopted of requiring the written consent of the contractor to connect, and holding him responsible for the cleaning up of the entire surface of the street has prevented the final payments for the sewer being delayed by the officers of the Highway Department, and the shifting of responsibility from the contractor to the plumber, formerly so common.

Of the 2,204 connections authorized 2,088 have been supervised by the Inspectors, leaving 168 unexamined by them, of which the other Inspectors have taken charge of 79.

This statement gives an imperfect idea of the work performed, as some jobs have required as many as five visits before completion.

Of the connections omitted, a large proportion were situated at such distant points from the central portion of the city that the Inspectors could not attend without missing one or more closer at hand. The progress of the sewering of the city has caused connections to be made the same day in Germantown,

Frankford, and Manayunk, and an Inspector might, with advantage, be employed for that portion of the city north of Lehigh avenue.

Intercepting Sewer.

The work on the intercepting sewer was continued during the year, and 6,708 2-10 feet or 1.27 miles completed, comprising section 1 (outlet), section 6 (tunnel), and sections 7 and 8.

There is now a completed sewer extending from the Schuylkill river near Callowhill street along the river to a point about 200 feet north of the Reading Railroad bridge, crossing the Schuylkill river at Falls Village, a distance of 19,271 5–10 feet, or 3 65–100 miles, with flushing gates, manholes and ventilators, etc.

Total cost, ...	$259,358 89
Average cost per foot, . .	13 46
Average cost per mile, . .	71,056 00

Section 11, consisting of iron pipe sewer 42 inches in diameter, to be laid in the canal at Manayunk near the locks, was advertised for and awarded to R. J. Malone & Bro. for the sum of $13 per lineal foot. Nothing but excavation has been done thus far.

The Engineer Corps, under Assistant Engineer George H. Paddock, has been engaged in giving the lines and grades for the sewer, also in general superintendence of the construction; they have extended the surveys from Falls stone bridge to Manayunk and prepared notes and plans of same, from which the office drawings have been plotted. They have made tests of the cements used in the construction of the sewer and kept records showing the tensile strength of each car load received.

Section 1 "Outlet" was awarded to John J. Kennedy. The work included about 15 feet of brick sewer four feet six inches in diameter, and about 90 feet of wrought iron pipe three feet in diameter, to be laid on the bottom of the river, and a special casting to connect the brick sewer and wrought

iron pipe. A manhole was placed immediately over this connection. The contractor employed the American Dredging Company to make a submarine excavation and lay the pipe. A diver was constantly employed.

After the excavation was made the trench was carefully sounded and found to be correct for grade and line; the pipe was lowered into position and covered with concrete and the brick work completed. The price is $38.99 per foot for 124.2 feet, costing $4,842.55. Work commenced June 25 and finished September 10, 1885.

Section 1 B. The footwalks and lawns disturbed during 1884 by reason of building this section, were restored by the contractor in the early spring. The final estimate was paid, amounting to $6,197.40.

Sections 3, 4 and 5. The final payments for these sections were made in 1885, the work being completed late in 1884. The 30 days allowed for advertising did not expire until this year.

Final estimate for Section 3, paid January 31, 1885,	$8,142 42
Final estimate for Section 4, paid February 6, 1885,	4,006 36
Final estimate for Section 5, paid February 9, 1885,	8,729 00

Section 6 (Tunnel Section), connecting sections 2 and 3. The brick work of this section is complete; the invert yet remains to be plastered; its length is 804 feet with one flushing gate and manholes.

The River Drive through the Park tunnel has been put in good order and travel has been resumed on it.

Price per foot, $14.38.

Payments, $7,296.

Work commenced June 25, 1885.

Section 7 extends from station 532+20 to station 562+50, a length of 3,030 feet; it includes one flushing gate and seven

manholes. This section begins near Strawberry Landing, and is located along the river bank until opposite Strawberry Spring, where it enters the line of the river drive, and continues along the same to a point near Nicetown lane (the end of the section). The stream entering the Schuylkill at this point has been culverted and carried under the intercepting sewer. All other streams were carried over by means of rectangular stone drains.

2,340 cubic yards of filling were placed upon the drive.

The section is completed, and has been advertised for final payment.

Price per foot, $9.00.

Payments, $22,752.00.

Work commenced April 13, 1885.

Work finished, December 8, 1885.

Section 8 Continues in the river drive from Laurel Hill landing to a point just south of the Reading Railroad bridge, where it is carried through the embankment of the Reading Railroad, and thence to the end of the section about 200 feet northward.

6,080 cubic yards of filling have been placed upon the drive, the top course being cinder, making a road suitable for ordinary park travel.

Price per foot, $8.50.

Price per cubic yard for filling, 50 cents.

Payments, $21,132.

Work commenced, April 13, 1885.

Work finished, December 8, 1885.

Old Sewers and Ventilation.

The yearly addition of fifteen miles of sewers of first-class workmanship and materials with self-cleansing grades and provision for ventilation is rapidly changing their average condition for the better, but the improvement of the condition of old sewers is not progressing as it should, and cannot until Councils appropriate a liberal sum of money to put in man-

holes and ventilators, by which easy access can be obtained to make examination of their defects. Most of the old sewers are deficient in this respect, and as this is a manufacturing city, many are filled with hot water, vapor, and gases, which render them difficult or unsafe for interior investigations or repairs. For a number of years this subject has been urged upon the attention of Committees of Councils without their being sufficiently awakened to the great necessity of the case to make the needed appropriation. The grades of the old sewers are generally sufficient to secure self-cleaning velocities, and if all defects and obstructions were removed and the interiors properly plastered so as to insure the speedy removal of all sewage, ventilation in the streets could be generally adopted by means of open manholes and ventilators at frequent intervals, permitting free ingress and egress of the air and gases. This mode is now so generally adopted in improved sewerage systems as to be almost universally accepted as the best by experienced engineers.

The admixture of sewer gas in limited quantities with the atmosphere speedily neutralizes its injurious effects, while a partial ventilation, with too few outlets, causes concentration of the gases, which become offensive and dangerous to health.

Efforts to ventilate by an insufficient number of openings is likely to result in failure. Therefore it is important that ventilation by this means should be completed throughout the whole drainage area in order to secure success.

Delaware River Survey.

The triangulation points established last year along both sides of the Delaware river, between Bridesburg and Poquessink creek, have been made use of in the topographical survey of the shores. Five large sheets of the scale of 200 feet to the inch have been completed by means of the plane table, showing high and low water marks, the marshes and islands and wharves and buildings near the river. They have been inked in so that they can be photographically reduced to 800

feet to the inch, so as to correspond in character with the plans heretofore made between Bridesburg and the mouth of the Schuylkill river.

The work was supervised by the officers of the United States Coast and Geodetic Surveys. The details of the survey are complete and accurate, Mr. John H. Webster, Jr., having charge of the field work. When the organization was made in the spring it was ascertained that the corps of United States engineers were about taking soundings and correct observations over the same territory, and it was expected that the data obtained by them could be used in completing the hydrography on our charts, but at the close of the season it was discovered that these observations were insufficient, therefore it will be necessary to continue the river observations next year in order to complete the plans. Two thousand dollars has been expended during the year on the work.

Test lines and levels of surveys and topography have been made in several districts, demonstrating the accuracy of the work. The triangulation points established throughout the city last year have, by calculations, been referred to the centre line of Broad street as a base line, so that the exact distances by the United States standard from Broad street and Market street are now recorded for points in various parts of the city.

In conclusion, I wish to report to you the general interest in the welfare of the Department manifested by the employees generally. Their industry and attention to duty is well worthy of favorable mention. The large amount of work done in the Engineering Department, under the efficient management of Mr. J. Milton Titlow, Principal Assistant Engineer, who has held this position for thirteen years, is shown in the large accumulation of valuable and complete drawings and designs of bridges, sewers and miscellaneous charts—aided by efficient draughtsmen—many of the drawings are models of excellence.

Mr. John K. Little, Assistant Engineer, having charge of sewer building and most of bridge construction, has managed

this division of the service so as to maintain the high standard of workmanship which our specifications call for.

The great increase in the business of the Department and the transfers of additional duties from others to this, has increased the labors of the Chief Clerk, Mr. George Sturges, who has served the city continually in this capacity since the organization of the department in 1855, and the service has been divided.

Mr. Edward H. Thompson has charge of issuing licenses for sewer connections, the custody of the sewer records and the direction and control of the Inspectors of house drainage.

The Registrar, Mr. John H. Dye, has had charge of the Registry Bureau since its organization in 1865, and also the records of dedication and opening of streets, and the certifying thereto for each and every street before the laying of water pipes and sewers, or paving and grading, as now required by Councils Committees before the passage of ordinances relating thereto, which involves a large amount of additional labor and care.

The custody of the plans of city streets and explaining them to citizens and attending the courts generally twice in a week and also upon all road juries appointed for opening streets, consumes much time.

The large appropriations made at the first of the year for sewers and bridges has thrown upon us such an amount of labor, especially the necessity of promptly proceeding with the Manayunk Intercepting Sewer and the projected iron bridge over the River Schuylkill at Market street, that these have been given precedence over the other work and will explain to you the lateness of furnishing you with this report. Several tables giving details relative to work and expenditures are herewith appended.

Respectfully submitted,

SAML. L. SMEDLEY,

Chief Engineer and Surveyor.

HOUSE DRAINAGE, ETC.

The number of licenses to connect with sewers issued during the year ending December 31, 1885, was 2,204, distributed throughout the year as follows:

January	32	July	282
February	8	August	234
March	72	September	243
April	257	October	245
May	273	November	224
June	252	December	82
		Total	2,204

The following table shows the number of connections made in each ward:

Wards.	No.	Wards.	No.
First	41	Seventeenth	31
Second	23	Eighteenth	38
Third	22	Nineteenth	202
Fourth	20	Twentieth	101
Fifth	46	Twenty-first	6
Sixth	61	Twenty-second	75
Seventh	43	Twenty-third	6
Eighth	92	Twenty-fourth	216
Ninth	56	Twenty-fifth	52
Tenth	68	Twenty-sixth	34
Eleventh	24	Twenty-seventh	94
Twelfth	26	Twenty-eighth	251
Thirteenth	13	Twenty-ninth	232
Fourteenth	72	Thirtieth	30
Fifteenth	104	Thirty-first	55
Sixteenth	25	Fairmount Park	9

The character of the drainage was:

Surface	836	Factories	7
Water-closets	2,552	Ice houses	1
Water-privies	330	Market house	1
Sinks	264	Brewery	5
Cellars	220	Water motor	1
Stables	26	Dye-house	2
Slaughter houses	9	For future use	12
Public bath	1	Miscellaneous	5

Length and Cost of Sewers Built during the year 1885.

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellh'ls. No. built.	Wellh'ls. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Amboy street, from Jefferson to 288 feet north of Oxford	3 ft. 0 in. x 2 ft. 0 in.	814	3	1	$85 00	4	$23 00	.....	.....	2 19	$1959 66	.....	$16 34	$1950 66	S. R. Franklin	M. C. Hong.
American street, from Somerset to Cumbria to Reese streets	3 ft. 6 in. x 2 ft. 4 in.	878.33	2	7	90 00	10	20 00	.....	.....	2 30	3867 81	$1279 86	.....	5147 67	W. May	M. O'Rourke.
	2 ft. 0 in. x 2 ft. 0 in.	285.67	3	4	88 00					2 00						
	2 ft. 6 in. x 1 ft. 8 in.	723.25								1 90						
Addison street, from Eighteenth to Nineteenth streets	12 inch-pipe	421	.....	.....	.....	4	29 00	.....	.....	2 00	958 00	.....	126 00	958 00	James Duffy	W. H. H. Achuff.
Alder street, from Columbia avenue to summit, south	3 ft. 0 in. x 2 ft. 0 in.	287	.....	.....	.....	2	23 00	.....	.....	2 19	674 53	.....	26 47	674 73	B. E. Hooven	M. C. Hong.
Albion street, between Locust and Spruce street	12-inch pipe	321	.....	.....	.....	3	25 00	.....	.....	1 27	482 67	.....	308 59	482 67	A. Ruth	J. B. Foster.
Broad street, from Arch to Race streets	3 ft. 0 in. x 2 ft. 0 in.	660	3	2	75 00	4	27 00	.....	.....	2 23	734 00	995 80	.....	1729 80	S. H. Collom	H. C. Eyre.
Broad street, from Washington avenue to S. Marshall street	2-inch pipe	221	3	1	90 00	2	25 00	.....	.....	1 20	274 37	130 83	.....	405 20	A. Ruth	J. B. Foster.
Bailey street, from Zimmerman to Oxford street	3 ft. 0 in. x 2 ft. 0 in.	274	1	2	100 00	2	25 00	.....	.....	2 87	633 50	402 88	.....	1036 38	S. R. Franklin	G. H. Miller.
Barker street, from Twenty-first to Twenty-second streets	12-inch pipe	443	.....	.....	.....	4	23 00	.....	.....	1 37	698 91	.....	263 09	698 91	N. B. Beam	M. C. Hong.
Barker street, from Eighteenth to Nineteenth streets	2 ft. 3 in. x 1 ft. 6 in.	453	.....	.....	.....	3	23 00	.....	.....	2 09	1015 77	.....	16 74	1015 77	C. R. Vanhorn	M. C. Hong.
Brown st., fr. Corinthian ave. to Capital, and on Capital to Parrish street	2 ft. 6 in. x 1 ft. 8 in.	690	.....	.....	.....	5	25 00	.....	.....	1 90	1246 00	.....	23 08	1246 00	S. R. Franklin	Joseph McDonald.
Brandywine st., from Sixteenth to Seventeenth streets	2 ft. 3 in. x 1 ft. 6 in.	435	.....	.....	.....	3	24 00	.....	.....	1 89	894 15	.....	210 01	894 15	E. Y. Shelmire	M. C. Hong.
Church street, from Third st. to summit, east	12-inch pipe	386.50	.....	.....	.....	4	25 00	1	$80 50	1 35	702 27	.....	289 58	702 27	George Moore	S. Cox.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wellh'ls.		Cost per foot.	Payments		Excess bills and balances.	Total cost.	Inspectors.	Contractor.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Cost each.		In assessment bills.	In city warrants.				
Cambria street, from Germantown avenue to Hancock street.	3 ft. 6 in. x 2 ft. 4 in.	222	.....	.....	.....	1	$30 00	1	49 00	2 37	535 81	69 33	.....	605 14	G. L. Deitz	S. A. Miller.
Carlisle street, from Master to Columbia avenue	3 ft. 0 in. x 2 ft. 0 in.	1546	3	5	86 00	8	24 00	.....	.....	2 15	3812 54	133 36	.....	3945 90	G. Moore	S. Cox.
Centre street, from Germantown avenue to Hancock street	2 ft. 6 in. x 1 ft. 8 in.	1256.50	3	3	80 00	6	24 00	.....	.....	2 83	3117 21	192 10	.....	3309 31	B. E. Hooven	J. Nolan.
Coulter street, from Hancock to Cumberland street	3 ft. 0 in. x 2 ft. 0 in.	440	.....	.....	.....	1	25 00	.....	.....	2 19	988 60	.....	51 06	988 60	F. J. Watt	J. Noonan.
Columbia avenue, from Fifteenth to Sydenham street	2 ft. 3 in. x 1 ft. 6 in.	173	.....	.....	.....	1	25 00	.....	.....	2 15	396 95	.....	76 67	396 95	J. P. Colebaugh	J. Noonan.
Carlisle street, from Susquehanna avenue to Dauphin street	2 ft. 6 in. x 1 ft. 8 in.	567	3	1	71 00	4	23 00	.....	.....	2 42	1426 50	131 32	.....	1557 82	J. Abel, Jr.	H. C. Eyre.
D street, from Hart lane to Indiana street	3 ft. 6 in. x 2 ft. 4 in.	493.75	3	2	75 00	3	27 00	.....	.....	2 37	1276 11	125 08	.....	1401 19	C. Breininger	H. C. Eyre.
Dauphin street, from Tenth to Eleventh streets	3 ft. 0 in. x 2 ft. 0 in.	423	.....	.....	.....	2	25 00	.....	.....	2 20	980 60	.....	72 47	980 60	Jas. McGill	F. P. Deehan.
Diamond street, from Twenty-second to Croskey and on Croskey to Norris streets	3 ft. 0 in. x 2 ft. 0 in.	808	.....	.....	.....	4	23 00	.....	.....	2 07	1364 92	389 00	.....	1753 92	S. R. Franklin	M. C. Hong.
Darien street, from Poplar to summit, north	2 ft. 3 in. x 1 ft. 6 in.	487	.....	.....	.....	3	23 00	.....	.....	2 05	1067 35	.....	204 20	1067 35	G. L. Deitz	H. C. Eyre.
Eighth street, from Venango to Rising Sun lane	3 ft. 6 in. x 2 ft. 4 in.	280	2	1	90 00	1	23 00	.....	.....	4 47	625 64	779 19	.....	1404 83	C. Y. Lauderbach	M. C. Hong.
Eighteenth street, from Girard avenue to south of Hammond st.	12 inch pipe	233	3	1	80 00	2	30 00	.....	.....	1 24	329 97	98 95	.....	428 92	G. L. Deitz	G. H. Miller.
Eighth street, from Huntingdon street to Lehigh avenue	3 ft. 6 in. x 2 ft. 4 in.	545	2	3	80 00	4	23 00	.....	.....	1 98	1240 40	171 10	.....	1411 10	C. R. Van Horn	T. McCann.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wells'ts. No. built.	Wells'ts. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Ellsworth street, from Twenty-third to Twenty-fourth streets.	2 ft. 3 in. x 1 ft. 6 in.	475	3	4	$80 00	3	$25 00	.....	.....	2 09	$1105 50	$280 16	.....	$1387 75	B. E. Hooven	G. H. Miller.
Eighth street, from Cherry to 300 feet north	12 in. pipe	329	.....	.....	.....	3	23 00	.....	.....	1 83	.....	671 07	.....	671 07	George Moore	M. C. Hong.
Eighth street, from Wharton to Reed streets	3 ft. 6 in. x 2 ft. 4 in.	429.50	3	4	71 00	3	23 00	.....	.....	2 39	938 63	436 37	.....	1375 00	James McGill	H. C. Eyre.
Fairmount avenue, from Orion to Thirty-third streets	2 ft. 6 in. x 1 ft. 8 in.	600	2	2	90 00	3	24 00	.....	.....	2 33	1151 64	498 36	.....	1650 00	S. R. Franklin	M. C. Hong.
Fawn street, from Jefferson to summit, north	2 ft. 3 in. x 1 ft. 6 in.	974	3	2	75 00	5	23 00	.....	.....	2 09	2300 66	.....	$62 86	2300 66	S. R. Franklin	M. C. Hong.
Fortieth street, from Filbert to summit, north	2 ft. 3 in. x 1 ft. 6 in.	295	.....	.....	.....	1	23 00	.....	.....	1 72	533 35	.....	114 59	533 35	N. B. Beam	J. McParland.
Forty-seventh street, from Westminster to Wyalusing avenues.	2 ft. 6 in. x 1 ft. 8 in.	606.70	2	4	89 00	3	23 00	.....	.....	1 96	1295 21	318 92	.....	1614 13	N. B. Beam	J. McParland.
Franklin street, from Lehigh av. to Huntingdon street, thence to Seventh	3 ft. 0 in. x 2 ft. 0 in.	727.50	2	3	80 00	6	23 00	.....	.....	1 94	1625 08	141 27	.....	1706 35	C. R. Van Horn	T. McCann.
Fifth street, from Venango street to Sedgley avenue	3 ft. 0 in. x 2 ft. 0 in.	401.16	.....	.....	.....	3	22 00	.....	.....	2 02	876 35	.....	39 56	876 35	J. P. Colebaugh	W. H. Yoast.
Fifth street, from Venango street to Erie avenue	3 ft. 0 in. x 2 ft. 0 in.	548.67	3	1	80 00	3	23 00	.....	.....	2 13	1317 66	.....	32 34	1317 66	J. P. Colebaugh	M. C. Hong.
Fourth street, from Cambria to Indiana street	15 in. pipe	531.50	.....	.....	.....	5	25 00	.....	.....	1 15	736 22	.....	504 78	736 22	William May	M. O'Rourke.
Fourth street, from Cambria to Somerset street	15 in. pipe	547	2	1	100 00	5	25 00	.....	.....	1 15	854 05	.....	461 08	854 05	William May	M. O'Rourke.
Fourth street, from Cumberland to York street	2 ft. 3 in. x 1 ft. 6 in.	556	3	1	69 00	4	22 00	.....	.....	1 91	1218 96	.....	148 04	1218 96	J. P. Colebaugh	W. H. Yoast.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellh'ls. No. built.	Wellh'ls. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Front street, from South to Christian streets	12-inch pipe	275								1 50					C. R. Van Horn	J. M. Mack.
	2 ft. 6 in. x 1 ft. 8 in.	519	3	2	75 00	10	22 00	1	31 50	2 10	4774 16	91 42	.....	4865 58		
	3 ft. 0 in. x 2 ft. 0 in.	575.75								2 25						
	3 ft. 6 in. x 2 ft. 4 in.	666.50								2 50						
Fifth street, from York to summit	3 ft. 0 in. x 2 ft. 0 in.	285	.....	.....	.....	2	28 00	.....	.....	2 29	698 65	.....	34 33	698 65	S. R. Franklin	M. C. Hong.
Fifth street, from Germantown avenue to Berks street	3 ft. 0 in. x 2 ft. 0 in.	435	.....	.....	.....	3	23 00	.....	.....	2 19	838 78	182 87	.....	1021 65	G. L. Deitz	M. C. Hong.
Fifteenth street, from Federal to Wharton streets	3 ft. 0 in. x 2 ft. 0 in.	603	3	4	75 00	3	23 00	.....	.....	2 12	1424 82	222 54	.....	1647 36	C. Breininger	T. McCann.
Girard avenue (north side), from Twenty-seventh to Twenty-eighth streets	2 ft. 3 in. x 1 ft. 6 in.	381	.....	.....	.....	3	23 00	.....	.....	1 93	483 08	321 25	.....	804 33	Jas. McGill	M. C. Hong.
Hutchinson street, from Thompson to Master streets	3 ft. 0 in. x 2 ft. 0 in.	457	3	1	95 00	3	28 00	.....	.....	2 19	1179 83	.....	9 92	1179 83	J. Abel, Jr.	W. H. Yoast.
Huntingdon street, from Eighth to Ninth streets	3 ft. 0 in. x 2 ft. 0 in.	262	2	1	80 00	1	20 50	.....	.....	2 17	515 00	154 04	.....	669 04	C. R. Van Horn	B. McNichol.
Holly street, from Baring to Spring Garden streets	2 ft. 3 in. x 1 ft. 6 in.	429	.....	.....	.....	3	17 00	.....	.....	1 97	876 90	19 23	.....	896 13	S. R. Franklin, E. Y. Shelmire	J. J. Gorman.
Johnson street, from 100 feet southwest of Germantown ave. to Adams streets, thence to Duval street	3 ft. 6 in. x 2 ft. 3 in.	1662	2	4	110 00	8	27 00	.....	.....	2 97	4662 45	1229 69	.....	5892 14	C. P. McCully	J. Nolan.
			3	3	160 00											
Julianna street, from Wood to Callowhill streets	2 ft. 3 in. x 1 ft. 6 in.	300	.....	.....	.....	2	28 00	.....	.....	2 23	725 00	.....	10 37	725 00	J. P. Colebaugh	T. H. Regan.
Lawrence street, from Indiana to Clearfield streets, thence westward	3 ft. 0 in. x 2 ft. 0 in.	96	3	2	71 00	6	23 00	.....	.....	2 13	1300 69	.....	371 31	1300 69	J. McGill	H. C. Eyre.
	15-inch pipe	535.25								1 47						

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellh'ls. No. built.	Wellh'ls. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Lancaster avenue, from Forty-fifth to Forty-eighth streets.	3 ft. 6 in. x 2 ft. 4 in.	1014	2	2	93 00	8	25 00			2 24	3944 86	113 85		4058 71	G. L. Deltz	S. Cox.
	2 ft. 6 in. x 1 ft. 8 in.	560	3	2	89 00					2 15						
Lancaster avenue, from Baring to Hamilton streets	2 ft. 3 in. x 1 ft. 6 in.	323				2	25 00			1 90	663 70		68 59	663 70	S. R. Frankl	J. McDonald.
Leithgow street, from Cambria to summit, south	12 in. pipe	404				4	$25 00			80	$423 20		637 57	$423 2	W. May	M. O'Rourke.
Leithgow street, from George to Canal streets	3 ft. 0 in. x 2 ft. 0 in.	555				3	22 00			2 19	1281 45		12 23	1281 45	J. P. Colebaugh	W. H. Yoast.
Locust street, from Sixteenth to Seventeenth streets	2 ft. 3 in. x 1 ft. 6 in.	437				3	25 00			2 13	825 00	180 81		1005 81	C. Y. Lauderbach.	S. A. Miller.
Laurel street, from New Market to Canal streets	3 ft. 0 in. x 2 ft. 0 in.	341	3	1	$80 00	2	29 00			2 57	809 15	205 22		1014 37	C. Breininger	W. H. H. Achuff.
Lawrence street, from Cambria to summit	15 in. pipe	409				4	30 00			1 20	610 80		564 70	610 80	Jas. McGill	G. H. Miller.
Marshall street, from Norris street to Montgomery avenue	2 ft. 3 in. x 1 ft. 6 in.	1,021	3	4	75 00	6	22 00			2 05	2525 05		203 58	2525 05	J. P. Colebaugh	W. H. Yoast.
Mutter street, from Huntingdon to Dauphin streets	3 ft. 0 in. x 2 ft. 0 in.	1,652	3	3	73 00	9	20 00			2 19	4016 88		193 97	4016 88	B. E. Hooven	B. McNichol.
Mutter street, from Norris to Berks street	3 ft. 0 in. x 2 ft. 0 in.	459				2	27 00			2 16	1045 44		243 06	1045 44	J. Abel, Jr.	T. H. Regan.
Master street, from Thirtieth to Thirty-first streets	3 ft. 0 in. x 2 ft. 0 in.	459				3	23 00	1	35 00	2 35	915 00	525 00		1440 00	F. J. Watt	H. C. Eyre.
Montgomery street, from Twenty-seventh to Stillman streets	2 ft. 6 in. x 1 ft. 8 in.	486	3	3	62 00	3	22 00			1 98	1152 28		11 96	1152 28	J. P. Colebaugh	W. H. Yoast.
Myrtle street, from Eleventh to Twelfth streets	2 ft. 3 in. x 1 ft. 6 in.	446	3	1	75 00	3	25 00			2 45	1107 70	135 00		1242 70	G. McLean	J. Noonan.
Mt. Vernon street, from Fortieth to Union streets	2 ft. 3 in. x 1 ft. 6 in.	238				2	25 00			1 92	422 80	84 96		506 96	N. B. Beam	J. Noonan.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wells.		Cost per foot.	Payments		Excess bills and balances.	Total costs.	Inspector.	Contractor.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Cost each.		In assessment bills.	In city warrants.				
Moravian street, from Fifteenth to Broad streets	12 in pipe	451				4	23 00			1 42	732 42		342 58	732 42	N. B. Beam.	M. C. Hong.
McKean street, from Ninth to Tenth streets	2 ft. 3 in. x 1 ft. 6 in.	446.16	3	1	68 00	2	25 00			2 00	905 90	104 43		1010 33	J. Duffy	F. P. Deehan.
Melloy street, from Sixteenth to Seventeenth streets	12 inch pipe	439				2	24 00			1 87	649 43		447 63	649 43	G. Moore	M. C. Hong.
Maria street, from Fifth to Ulrich Streets	12 inch pipe	186				1	25 00			1 25	258 33		84 05	258 33	W. May	F. P. Murray, Jr.
Ninth street, from Lehigh avenue to Cumberland street.	3 ft. 6 in. x 2 ft. 4 in. 3 ft. 0 in. x 2 ft. 0 in.	558 542	2	4	89 25	8	22 00			2 30 2 20	2609 30	399 50		3008 80	W. May	J. M. Mack.
Ogden street, from Fifteenth to Carlisle streets	2 ft. 3 in. x 1 ft. 6 in.	226				2	24 00			1 89	475 14		31 70	475 14	C. R. Van Horn	V. L. McGlue.
Oliver street, from Tenth to Eleventh streets	2 ft. 3 in. x 1 ft. 6 in.	290.25	3	1	79 00	2	28 00			2 13	673 68	79 55		753 23	J. Abel, Jr. F. J. Watt	T. H. Regan.
Ontario street, from Eighteenth to Nineteenth streets	2 ft. 3 in. x 1 ft. 6 in.	435				3	25 00			2 00	945 00		189 25	945 00	F. J. Watt	J. Noonan.
Orkney street, from Cambria street to Indiana avenue	15 inch pipe	532.50				5	25 00			1 15	737 37		731 63	737 37	W. May	M. O'Rourke.
Price street, from Evans to Hancock streets	3 ft. 0 in. x 2 ft. 0 in.	821	3	1	80 00	4	24 00	1	51 00	2 39	1878 23	290 00		2168 23	C. P. McCally	J. Nolan.
Parrish street, from Twenty-fifth to Bucknell streets	3 ft. 6 in. x 2 ft. 4 in.	634	2 3	1 4	75 00 68 00	3	25 00	1	101 50	2 30	908 43	1073 27		1981 70	J. McGill	F. P. Deehan.
Pine street, between Fortieth and Forty-first streets	2 ft. 3 in. x 1 ft. 6 in.	504				3	25 00			1 90	1032 60		296 40	1032 60	N. B. Beam	J. McDonald.
Pennock street, from Brown to Poplar streets	2 ft. 6 in. x 1 ft. 8 in.	841	1 3	1 1	85 00 64 00	6	19 00	1	123 75	2 16	1812 83	390 48		2203 31	J. Abel, Jr. J. McGill	T. H. Regan.
Pennsylvania ave., from Twenty-fourth to Gold streets	2 ft. 3 in. x 1 ft. 6 in.	312	3	1	80 00	3	29 00			2 99	277 50	794 30		1071 80	D. S. Rorer	W. H. H. Achuff.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells. No. built.	Wells. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Potts street, from Thirteenth to Broad streets	2 ft. 3 in. x 1 ft. 6 in.	565	3	1	$75 00	4	$22 00			2 39	1428 06	85 29		1513 3	J. Abel, Jr.	T. H. Regan.
Parrish street, from Twenty-third to Bucknell streets	3 ft. 0 in. x 2 ft. 0 in.	274	3	2	71 00	2	23 00			2 26	324 03	483 24		807 24	J. McGill	H. C. Eyre.
Queen st., from Fifth to Sixth sts.	3 ft. 0 in. x 2 ft. 0 in.	435	3	1	75 00	2	27 00			2 16	1055 29	13 31		1068 60	J. Abel, Jr.	T. H. Regan.
Queen street, from Germantown avenue to Wayne street	3 ft. 6 in. x 2 ft. 4 in.	1818	2 3	5 3	79 00 71 00	9	23 00			2 31	3991 71	1022 87		5014 58	S. H. Collom	H. C. Eyre.
Race street, from Thirty-second Thirty-third streets	2 ft. 6 in. x 1 ft. 8 in.	426	3	1	70 00	2	25 00			2 00	966 95	5 05		972 00	C. Y. Lauderbach.	J. Noonan.
Rittenhouse street, from Twentieth to Twenty-first streets	12-inch pipe	525				4	23 00			1 37	811 25		350 50	811 25	G. Moore	M. C. Hong.
Rittenhouse street, from Nineteenth to Twentieth, thence to Locust street	12-inch pipe	453.50				3	30 00			1 21	638 73		295 02	638 73	C. Y. Lauderbach / G. Moore	G. H. Miller.
Susquehanna avenue, from Seventh to Germantown avenue	2 ft. 3 in. x 1 ft. 6 in.	386				2	22 00			1 93	436 36	350 00		786 36	C. Y. Lauderbach.	M. C. Hong.
Spring Garden st., from Thirty-second to Thirty-third streets	3 ft. 0 in. x 2 ft. 0 in.	286.50				2	23 00			2 37	682 34		20 28	682 34	J. Abel, Jr.	M. C. Hong.
Somerset st., from Germantown avenue to Franklin street	3 ft. 0 in. x 2 ft. 0 in.	927.16				4	23 00			2 35	2040 97			2040 97	W. Yetter	J. Nolan.
Spring Garden street, between Twentieth and Twenty-first sts.	2 ft. 3 in. x 1 ft. 6 in.	440 00				3	25 00			1 99	629 96	329 64		959 60	C. Y. Lauderbach.	J. Noonan.
Spring Garden street, between Twentieth and Twenty-first sts.	2 ft. 3 in. x 1 ft. 6 in.	103 00	3	1	75 00	1	22 00			1 95		297 85		397 85	E. Y. Shelmire	T. H. Regan.
Scott street, from Nineteenth to Twentieth street	3 ft. 0 in. x 2 ft. 0 in.	430				3	25 00			2 30	1034 00			1064 00	C. Y. Lauderbach.	J. Noonan.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellh'ls No. built.	Wellh'ls Cost each.	Per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Sixteenth street, from Dauphin street to Susquehanna avenue	3 ft. 6 in. x 2 ft. 4 in.	624	2	4	$79 00	3	$23 00	.....	.....	2 29	1273 41	$539 59	.....	$1813 00	N. B. Beam	H. C. Eyre.
Sixteenth street, from Alleghany avenue to Westmoreland street	2 ft. 6 in. x 1 ft. 8 in.	591	.....	.....	.....	3	25 00	.....	.....	2 00	1257 00	.....	168 00	1257 00	F. J. Watt	J. Noonan.
Sixth street, from Thompson st. to Girard avenue	2 ft. 3 in. x 1 ft. 6 in.	384	.....	.....	.....	2	24 00	.....	.....	1 97	804 48	.....	122 16	804 48	J. P. Colebaugh	V. L. McGlue.
St. Joseph's avenue, from Seventeenth to Eighteenth streets	2 ft. 3 in. x 1 ft. 6 in.	428	3	1	75 00	3	27 00	.....	.....	2 17	1084 76	.....	30 74	1084 76	N. B. Beam	T. H. Regan.
St. John street, from Brown to Poplar streets	2 ft. 6 in. x 1 ft. 8 in.	499	3	1	85 00	3	25 00	.....	.....	2 21	1255 26	7 53	.....	1262 79	C. Breininger	W. B. M. Conklin.
Sansom street, from Eighteenth to Nineteenth streets	2 ft. 3 in. x 1 ft. 6 in.	431	.....	.....	.....	3	29 00	.....	.....	2 08	965 48	.....	82 03	965 48	N. B. Beam	T. McCann.
Smedley street, from Venango to Erie streets	2 ft. 6 in. x 1 ft. 8 in.	558	.....	.....	.....	3	25 00	.....	.....	2 05	1218 90	.....	131 10	1218 90	F. J. Watt	J. Noonan.
Smedley street, from Ontario to Tioga streets	2 ft. 3 in. x 1 ft. 6 in.	540	.....	.....	.....	3	19 00	.....	.....	1 87	1066 80	.....	150 70	1066 80	G. L. Deitz	T. H. Regan.
South street, from Eighteenth to Nineteenth streets	2 ft. 6 in. x 1 ft. 8 in.	424	3	3	80 00	3	24 00	.....	.....	1 93	1125 00	.....	63 00	1125 00	C. R. Vanhorn	M. C. Hong.
Seventeenth street, from Pine to Addison streets, thence to Eighteenth street	12 in. pipe..... 450.50 15 in. pipe..... 194.50		3	3	85 00	5	27 00	.....	.....	1 31 1 37	1258 40	.....	229 85	1258 40	A. Ruth	J. R. Foster.
Seneca street, from Forty-eighth to Markoe streets	3 ft. 0 in. x 2 ft. 0 in.	628.50	2	4	90 00	3	24 00	.....	.....	2 03	1338 73	369 12	.....	1707 85	N. B. Beam	M. C. Hong.
Thirty-third street, from Pennsylvania avenue to Master street	3 ft. 6 in. x 2 ft. 4 in.	496	2	1	79 00	3	27 00	.....	.....	2 63	558 00	669 78	.....	1227 78	W. Wilson	H. C. Eyre.
Twenty-second st., from Washington avenue to Federal street	3 ft. 6 in. x 2 ft. 4 in.	567	3	7	79 50	3	27 89	.....	.....	2 32	1074 68	875 32	.....	1950 00	E. Y. Shelmire	T. H. Regan.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wells. No. built.	Wells. Cost each.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Excess bills and balances.	Total cost.	Inspector.	Contractor.
Twelfth street, from Melon to Potts, thence to Thirteenth st.	2 ft. 3 in. x 1 ft. 6 in.	553	3	1	80 00	4	24 00	.....	.....	2 33	1321 93	142 56	.....	1464 49	J. Abel, Jr. / B. E. Hoopes	M. C. Hong.
Thirty-second st., from Marston to Walnut streets	2 ft. 6 in. x 1 ft. 8 in.	854	2 / 3	1 / 2	90 00 / 80 00	4	29 00	.....	.....	2 05	356 57	1200 00	.....	1656 57	J. McGill	W. H. H. Achuff.
Thirty-ninth street, from Powelton avenue to Baring street	2 ft. 6 in. x 1 ft. 8 in.	428.50	.....	.....	.....	2	23 00	.....	.....	1 96	885 86	.....	23 03	885 86	S. H. Collom	M. C. Hong.
Twenty-first street, from North College avenue to Master street	2 ft. 6 in. x 1 ft. 8 in.	333	.....	.....	.....	2	24 00	.....	.....	1 93	577 79	109 57	.....	687 36	W. May	M. C. Hong.
Twenty-fourth st., from Brown to Parrish streets	2 ft. 3 in. x 1 ft. 6 in.	378	.....	.....	.....	3	25 00	.....	.....	1 90	793 20	.....	274 80	793 20	J. McGill	J. Noonan.
Thirty-seventh street, from Rockland to Haverford streets	3 ft. 0 in. x 2 ft. 0 in.	190.25	3	1	70 00	1	20 50	.....	.....	2 13	377 57	118 16	.....	495 73	N. B. Beam	B. McNichol.
Third street, from Cambria to Somerset streets	15-inch pipe	547.25	3	1	100 00	5	25 00	.....	.....	1 15	854 33	.....	420 66	854 33	W. May	M. O'Rourke.
Twenty-fifth street, from Columbia to Montgomery avenues	3 ft. 0 in. x 2 ft. 0 in.	550	.....	.....	.....	3	25 00	.....	.....	2 00	1175 00	.....	109 53	1175 00	S. R. Franklin	G. W. Hansell.
Twenty-fifth street, from North College avenue to Thompson st.	2 ft. 3 in. x 1 ft. 6 in.	413	.....	.....	.....	1	28 00	.....	.....	2 05	862 82	.....	.....	862 82	F. J. Watt	T. H. Regan.
Twentieth street, from Lombard to South streets	12-inch pipe	847	.....	.....	.....	3	30 00	.....	.....	1 36	561 92	.....	108 16	561 92	G. Moore	M. C. Hong.
Twelfth street, from Parrish to Myrtle, thence to Thirteenth st.	2 ft. 3 in. x 1 ft. 6 in.	551	.....	.....	.....	4	28 00	.....	.....	2 11	1254 61	.....	60 23	1254 61	G. L. Deitz	H. C. Eyre.
Twenty-sixth street, from Brown to Parrish streets	2 ft. 3 in. x 1 ft. 6 in.	392	3	2	75 00	3	28 00	.....	.....	2 05	930 50	107 10	.....	1037 60	J. McGill	T. H. Regan.
Taney street, from Church street northward	2 ft. 3 in. x 1 ft. 6 in.	37.50	.....	.....	.....	.....	.....	.....	.....	2 25	84 37	.....	27 75	84 37	W. May	F. P. Murray, Jr.
Ulrich street, from Fairmount avenue to Maria street	2 ft. 6 in. x 1 ft. 8 in.	265	3	1	80 00	1	$25 00	.....	.....	2 29	$319 73	$254 72	.....	$574 45	C. Breininger	F. P. Murray, Jr.

Length and Cost of Sewers Built during the year 1885—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wells.		Cost per foot.	Payments		Excess bills and balances.	Total cost.	Inspector.	Contractor.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Cost each.		In assessment bills.	In city warrants.				
Valeria street, from Sixteenth to Seventeenth streets	2 ft. 3 in. x 1 ft. 6 in.	420	.....	.....	.....	2	25 00	.....	.....	2 10	932 00	.....	$50 86	932 00	G. L. Deitz	G. W. Hansell.
Venango street, from Seventeenth to Eighteenth streets	3 ft. 6 in. x 2 ft. 4 in.	447	.....	.....	.....	1	23 00	.....	.....	2 40	1022 00	.....	.....	1022 00	C. P. McCally	J. Nolan & Co.
Waterloo street, from Lehigh av. to Huntingdon street	3 ft. 0 in. x 2 ft. 0 in.	580	3	1	95 00	3	28 00	.....	.....	2 17	1437 60	.....	3 90	1437 60	M. A. McGrath	W. H. Yoast.
Warnock street, from Columbia avenue to summit, south	3 ft. 0 in. x 2 ft. 0 in.	232	.....	.....	.....	1	23 00	.....	.....	2 39	544 50	32 98	.....	577 48	S. R. Franklin	M. C. Hong.
Wakefield street, from Bringhirst to Ashmead streets	3 ft. 6 in. x 2 ft. 4 in.	243	3	3	95 00	1	25 00	.....	.....	2 50	635 82	206 68	.....	842 50	B. E. Hooven	J. Nolan.
Warnock street, from Berks street to Montgomery avenue	3 ft. 0 in. x 2 ft. 0 in.	540	3	4	79 50	3	27 89	.....	.....	2 22	1223 00	377 47	.....	1600 47	J. Abel, Jr.	T. H. Regan.
Wharton street, from Thirteenth to Nineteenth streets	3 ft. 6 in. x 2 ft. 4 in. 3 ft. 0 in. x 2 ft. 0 in.	1524.67 1313	3	20	65 00	15	23 00	.....	.....	2 23 2 03	5704 10	2006 48	.....	7710 58	M. A. McGrath. G. L. Deitz. J. Abel, Jr.	M. C. Hong.
Wallace street, 100 feet east from Forty-first to Ludwick streets	2 ft. 6 in. x 1 ft. 8 in.	215	2	1	90 00	1	25 00	.....	.....	2 37	441 12	183 43	.....	624 55	B. E. Hooven	W. H. H. Achuff.
Wayne street, from Mt. Vernon to Wallace streets	2 ft. 3 in. x 1 ft. 6 in.	250	3	1	76 00	2	30 00	.....	.....	3 24	510 40	185 60	.....	696 00	B. E. Hooven	G. H. Miller.
York street, from Broad to Fifteenth streets	3 ft. 0 in. x 2 ft. 0 in.	517	2 3	2 4	79 00 75 00	3	27 00	.....	.....	2 43	870 66	921 50	.....	1792 26	J. Abel, Jr.	H. C. Eyre.
York street, from Twenty-second street to Sedgley avenue	3 ft. 0 in. x 2 ft. 0 in.	653	2	2	90 00	3	25 00	.....	.....	2 65	964 14	1021 31	.....	1985 45	W. May	G. H. Miller.

Detailed Statement of Branch Sewers Built by the City during 1885.

Branch sewers.				Brick and stone Inlets.				Manholes.			Wellholes.			Payments		Inspection.		Total costs, including all details.	Average cost per foot, including all details.
Length.		Excluding details.																	
Feet.	Miles.	Total cost.	Cost per foot.	Size.	Number built.	Total cost.	Cost each.	Number built.	Total cost.	Cost each.	Number built.	Total cost.	Cost per foot.	In assessment bills.	In city warrants.	Total cost.	Cost per foot.		
71,747.14	13.588	$149,375 94	$2 08	1 2 3	3 53 133	$285 4,642 9,993	$95 00 87 58 75 14	434	$10,474 34	$24 13	7	$472 25	$4 75	$149,358 27	$25,760 67	$9,396 45	.13	$184,515 39	$2 57

Size.	Length in feet.	Average cost per foot excluding details.	Average cost per foot including manholes.	Average cost per foot including		
				Manholes and inlets.	Manholes, inlets and wellholes.	All details.
Egg shaped, 3 feet 6 inches x 2 feet 4 inches	13,021.75	$2 44	$2 56	$2 96	$2 97	$3 10
Egg shaped, 3 feet 0 inches x 2 feet 0 inches	22,314.16	2 20	2 33	2 55	2 55	2 68
Egg shaped, 2 feet 6 inches x 1 foot 8 inches	11,290.95	2 05	2 19	2 40	2 41	2 54
Egg shaped, 2 feet 3 inches x 1 foot 6 inches	15,907.91	2 07	2 23	2 33	2 33	2 46
Circular 15 inches	3,317.00	1 24	1 48	1 62	1 62	1 75
Circular 12 inches	5,895.37	1 38	1 60	1 63	1 68	1 81
Total	71,747.14					

Length and Sizes of Branch Sewers Built during 1885.

	Egg-Shaped Sewers.				Circular.		Total length in feet.	Total length in miles.
	3 ft. 6 in. x 2 ft. 4 in.	3 ft. 0 in. x 2 ft. 0 in.	2 ft. 6 in. x 1 ft. 8 in.	2 ft. 3 in. x 1 ft. 6 in.	15 ins.	12 ins.		
At public cost	13,021.75	22,314.16	11,290.95	15,907.91	3,317.00	5,895.87	71,747.14	13,588
At private cost		814.00	94.00		100.00	6,399.00	7,407.00	1,403
Total	13,021.75	23,128.16	11,384.95	15,907.91	3,417.00	12,294.87	79,154.14	14,991

Total Length of Sewers Built during 1885.

Description.	Feet.	Miles.
Main sewers*	12,551.66	2.377
Branch sewers	71,747.14	13.588
Branch sewers (private cost)	7,407.00	1.403
Total	91,705.80	17.368

* Includes Intercepting Sewer.

Main Sewers—Statement for 1885.

Location.	Diameter in feet.	Price per foot.	Length built in feet.	Payments. In city warrants.	Payments. In assessment bills.	Total cost.	Contractor.
Dauphin street, from Nineteenth street to Sedgley avenue, one chamber, $850 00	8½ 7½ 6½	$22 25 17 80 16 80	437.75 67.60	$13,411 41		$49,555 00	McCafferty & Malloy.
Broad street, from Dauphin street to Lehigh avenue, and on Cumberland street, east of Broad street				8,200 25	$3,139 18	21,889 07	Jas. F. Kennedy.
Clearfield street, across Sixteenth street	5.	10 87	153.97	1,799 98	253 67	2,055 63	H. C. Eyre.
Clearfield street, from Thirteenth to Broad streets	7½	13 75	598.00	7,066 66	1,115 84	8,222 50	Jas. Sullivan.
Lombard street, from east of Seventh to west of Eighth street	4½ x 6	17 82	726.00	11,239 12	1,698 20	12,937 32	Jas. F. Kennedy.
Snyder avenue, from Thirteenth to Sixteenth streets	2¾ x 4	6 15	1,524.39	6,422 73	2,952 30	9,375 03	F. P. Deehan.
Sixteenth street, from Snyder avenue to north of Mifflin street, one chamber, $700 00 " " 900 00	5½ 5¼ 3½ x 5¼ 2¾ x 4	9 33 8 43 7 73 5 87	49.00 797.85 238.50 8.60	6,727 86		10,673 60	M. C. Hong.
Twenty-fourth street, from Dauphin to York streets	7.	16 80	300.00	4,932 00			Jas. Sullivan.
Twenty-second street, from Dauphin to York streets	5¼ x 3½	9 87	579.00	4,656 11	1,254 62	5,910 73	M. C. Hong.
Dauphin street, from Twenty-fourth street to Sedgley avenue	6½	19 50	100.00	1,560 00			F. P. Deehan.
Annsbury street, across Fifth street	15½ x 24		164.00	4,320 00			Jas. F. Kennedy.
Sansom and Meadow streets, from near Forty-sixth street to near Chestnut street	20 x 20	49 99	160.00	6,400 00			M. O'Rourke.
Total			5,843.46	$75,836 12	$10,413 81		

Intercepting Sewer—Statement for 1885.

Section.	Length in feet.	Price per foot.	Cost per section.	Amount expended.	Commenced.	Finished.	Contractors.
1	124.2	$32 99	$4,842 55	$4,842 55	June 25, 1885.....	October 10, 1885.....	Jno. J. Kennedy.
6	804.	14 38	11,561 52	7,296 00	June 25, 1885.....	.....	S. E. Moore & Co.
7	3,030.	9 00	28,440 00	22,752 00	April 13, 1885.....	.....	B. Malone & Co.
8	2,750.	8 50	26,415 00	21,132 00	April 13, 1885.....	.....	B. Malone & Co.
Total.....	6,708.2	.....	$71,259 07	$56,022 55			

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR

OF THE

CITY OF PHILADELPHIA,

FOR THE YEAR 1886.

PHILADELPHIA:
DUNLAP & CLARKE, PRINTERS AND BINDERS, 819 & 821 FILBERT ST.
1887.

DEPARTMENT OF SURVEYS.

OFFICERS, 1886.

Chief Engineer and Surveyor.
SAMUEL L. SMEDLEY.

Principal Assistant Engineer,
J. MILTON TITLOW.

Assistant Engineer,
J. KAY LITTLE.

Recording Clerk,
EDWARD H. THOMPSON.

Sewer Register, WILLIAM CALVERT.
Sewer Clerk, WM. T. MCPHAIL.

Draftsmen.
George S. Connor, Carl A. Trik, George E. Datesman.
Stenographer and Type-writer, Joseph R. Scott. *Rodman*, Hugh Trik.
Messenger, Isaac Holland.

REGISTRY BUREAU.

Registrar, JOHN H. DYE.
Search Clerk, James W. Simmons. *Registry Clerk*, Richard B. Davis.

Draftsmen,
Jonathan Eggleton, William H. Wester, George H. Mercer,
Henry C. Glenn, Francis Lightfoot, Henry C. Hamer,
S. Crawford Smith.

Inspectors of Sewer Connections.
J. Sellers Kite, George F. Uber.

Inspectors of Sewer Construction.

Henry M. Smith,	S. R. Franklin,	David J. Davis,
William Wilson,	James Duffy,	Joseph Hunter,
Charles Y. Lauderbach,	George Moore,	Theodore D. Hooper,
Benjamin E. Hooven,	Newton B. Beam,	Michael McGrath,
William Yetter,	C. P. McCally,	George McLean,
Abraham Ruth,	C. R. Van Horn,	John McCormick,
George L. Deitz,	Findley J. Watt,	John G. Moore,
James McGill,	Joel P. Colebaugh,	David S. Rorer,
William May,	Theo. A. Brackney,	Edward Y. Shelmire,
John Abel, Jr.,	Wm. Penn Brown,	Emerick H. Sickels.
	Salathiel Cox,	

ANNUAL REPORT

OF THE

CHIEF ENGINEER AND SURVEYOR,

FOR THE YEAR 1886.

Philadelphia, January, 1887.

HON. WILLIAM B. SMITH,
Mayor of Philadelphia.

DEAR SIR —I herewith submit a statement of the general condition and business of this Department, together with the amount of appropriations, receipts and expenditures for the year ending December 31st, 1886:

The appropriation under Ordinance of December 30th, 1885, was		$355,918 00
To which was added, from the appropriation of 1885, which did not merge		81,795 67
Appropriation of March 16th, 1886		17,700 00
Appropriation of April 6th, 1886		2,500 00
Appropriation of May 18th, 1886		523,000 06
Making a total of appropriation for and during 1886		$980,913 67
Expended during the year	$391,495 31	
Carried to the credit of contracts	559,030 39	
Balance which merged at the close of the year	30,387 97	
		980,913 67

The receipts from all sources amounted to $22,481.40, an increase over last year of $7,852.46; received for permits, $12,409; for certificates and searches in Registry Bureau, $2,412.75; for sewer bills and balances of accounts, $7,600.15; copies of plans, appeal fees, etc., $59.50. Total, $22,481.40.

Registry Bureau.

The work of the Registry Bureau has shown considerable gain. In addition to keeping up the work already plotted, nearly all the Twenty-second Ward, including the rural portions has been plotted. There were 2,924 more lots plotted than in 1885.

Total lots plotted, December 31, 1885	204,413
Total lots plotted during 1886	9,778
Total to December 31, 1886	214,191
Transfers entered December 31, 1885	253,588
Transfers entered during 1886	21,992
Total to December 31, 1886	275,580
Only 17,561 were entered last year; increase, 4,431.	
Total entries for the year 1886	31,770
Descriptions received December 31, 1885	407,996
Descriptions received during 1886	22,965
Total to December 31, 1886	430,961

Searches have been made out for 9,651 properties, 1,703 more than last year, for which $2,428.25 was received, an increase of $437.75.

City Plans and Surveys.

The work done on the City Plot during the last year has been confined exclusively to revisions of old plans, made necessary by a change of local conditions, the construction of lines of steam railroads, and by a more practical and intelligent study of the localities from the topographical surveys that have been made. During the year 1886, the revision of fourteen (14) sectional plans have been filled; from the care that has been exercised in their preparation, the City will save, in the grading of streets, many thousands of dollars, over and above the cost of the plans; and the owners of the real estate will be correspondingly benefited.

The topographical surveys have been extended as far as the limited appropriations would permit; covering, for the

year 1886, 2,624 acres; making a total area covered to date of 28,575 acres.

Under ordinances of Councils plans have been prepared for the revision of the lines and grades of twenty-two (22) individual streets, and for placing on the City Plans thirty-four (34) new intermediate streets in various portions of the City.

Bridges.

The contract for rebuilding the western approach of South street bridge with stone piers on the old foundations, and with iron-plate girder-spans, with granite block roadway and granolithic sidewalks having been cancelled, a new contract was made with H. G. Clement for its completion. The final payments were made during this year, although the work was finished December 12, 1885. Both contracts resulted in a total cost to the City of $79,820, the original contract price having been $81,920, the difference of $2,100 was deducted as damages for delay in completing the contract.

Spencer Street Bridge.

Spencer street bridge over the Norristown Railroad, near the Falls of Schuylkill, consists of stone abutments of rubble masonry, with two wrought-iron plate-girders, each seventy (70) feet long. The clear span is sixty-six (66) feet. The floor is 3-inch yellow pine, on seven (7) lines of 4″ x 6″ yellow pine floor joists, with 4″ x 4″ guard-rails. The contract price is $2,300; payments this year, $1,656.

Ontario Street Bridge,

Over the Norristown Railroad, has a clear span of sixty-six (66) feet six (6) inches. The abutments, including coping and bridge-seats, have been completed, and only one estimate of $761 was paid at the close of the year.

Fifty-second Street Bridge,

Over Mill creek, near Wyalusing avenue, is partially done; for work on the abutments $640 have been paid.

Abutment, Poplar Street.

The east abutment of a bridge over Pennsylvania avenue, at Poplar street has been finished. This is substantial range-work of Hummelstown brown-stone, for which the final estimate of $3,470 was paid on June 7, 1886.

Market Street Bridge.

The contract for the iron bridge over the Schuylkill river at Market street, with R. A. Malone & Sons, of Lancaster, Pennsylvania, was executed on the twenty-fourth day of June, 1886; the amount to be paid for the piers, abutments and iron superstructure, complete, is $271,000. Delays occurred in consequence of the veto of the ordinance approving the contract which became a law on the sixth of September; and on the seventh of September, the contractor was notified to commence work.

At the close of the year the old piers have been taken down to low-water mark, and also portions of the abutments. The latter have been rebuilt to the full height required, and the foundations of the shore piers are completed. The amount paid on account of work done is $18,297.92. For engineering and inspecting, $4,090.37.

The bridge consists of three spans across the river, the centre being 214.6 feet, and 97.6 feet on each side. The west shore plate-girder span across the Delaware extension of the Pennsylvania Railroad is 63.74 feet, and the span over the Schuylkill River East Side Railroad is 64.65 feet; a total of 550 feet. The bridge is designed as a deck-bridge, on the cantilever principle, and will have an asphaltum roadway of 52 feet wide and sidewalks 12½ feet each, to be paved with granolithic stone. The centre of the bridge will be 6.8 feet higher than the centre of the old bridge; the bottom chord of the centre span will be 23 feet above ordinary high-water. The heavy grade of the street on the east side of the river is continued on the shore span. The raising of Market street so as to dispense with the heavy grades west of the river has proved so benefi-

cial to the public, that there is a strong desire for raising it similarly on the east side, in which case one end of the plate-girder shore-span can be raised without detriment to the structure. Provision has been made for the conduits of the Cable Railroad and for water, gas, and electrical pipes.

The Schuylkill River East Side Railroad has been completed along the river, including the tunnel under Twenty-fifth street, from Callowhill street to Pennsylvania avenue, and along Pennsylvania avenue to Taney street, so that a perfect and safe connection between the Reading Railroad and the Philadelphia and Baltimore Railroad has been made, and the entrance to Fairmount Park and communication across the river at this point secured without the smoke, danger and detention of passing trains, the underground railroad being entirely out of view. A similar tunnel has also been built at Gray's ferry road, and the railroad passes under all the river bridges in its course along the wharves, which have been built continuously according to the Port Wardens' lines established by this Department.

The road was opened to travel between Philadelphia and Baltimore on the nineteenth day of September.

Intercepting Sewer.

Work on the intercepting sewer was continued during the year, and 11,786 feet, or 2.23 miles, comprising Sections No. 9, 10 and 11 were built.

Section 9 extends from Station 590 to Station 641, a total length of 5,100 feet; its point of commencement is about 200 feet north of Reading Railroad bridge. It continues along the northeast side of the river drive to a point above Rodman street, where it diverges slightly to the right, passing through the Park meadow between the river and Ridge avenue, crossing Ridge avenue and ending in the middle of the Wissahickon drive.

The brickwork is completed except where Dobson's run crosses the sewer.

The plastering of the invert has progressed very slowly, and a considerable portion yet remains to be done.

The refilling over the sewer is incomplete.

A terra-cotta pipe has been laid at various places along the line to accommodate the adjacent properties. Price per foot, $8.40. Payments, $28,032. Work commenced, June 5th, 1886.

SECTION 10 extends from Wissahickon drive, crossing Wissahickon creek through the new dam, and continuing along the Ridge road to the Main street, and along the same to Cedar street, Manayunk, where it turns to the left, crossing Ridge avenue, and connecting with the iron pipe sewer, Section 11, length, 5,019, 137.3, including connection at Wissahickon creek. Price per foot, $13.49. Total price for dam and connections, $13,400. Payments, $60,160.

SECTION 11 extends from near Main street to Harding's paper mill. Its point of commencement is in the race, near Main street, from which place it extends diagonally across the Schuylkill canal to the southwest side, thence continuing along the same to Harding's paper mill. Length, 1,667 feet. Size, 42" iron pipe. Price per foot, $13. Payments, $23,396.21.

SECTION 6. This section was completed last year, except the plastering of the invert, which was finished in the spring.

The final estimate was paid March 22; a deduction to cover damages for delay was made as follows: Thirty-six days at $5, $180.

SECTIONS 7 and 8. The final payment on these sections was made January 8th.

$4,325.52 was retained from the contractors, in accordance with a resolution of Select and Common Councils dated January 7th, 1886.

SECTION 12 of Manayunk sewer extends along the canal, from Harding's paper mill to Main street bridge. Work was commenced December 23d, and up to the end of the year nothing was done except excavation.

Storm-water Conduit in connection with Intercepting Sewer.

The storm-water conduit, diameter 8½ feet, along the north side of the Reading Railroad, Falls village, from the Schuylkill river north-eastward, has been completed to a point above Ridge avenue, a distance of 1,000 feet, including the outlet at the river and the chamber to connect the Ferry road sewer. Payments to date, $18,520.

Ferry Road Sewer,

From the storm-water sewer at Falls bridge to Ridge avenue, 150 feet of circular sewer, 3′ 3″ in diameter, and 120 feet of circular sewer, 2 feet in diameter has been built. Payments, $1,152.

Mifflin Street Sewer,

From Schuylkill river northeastward, crossing Ridge avenue, 280 feet of circular sewer, 6 feet and 5½ feet diameter, has been completed, including outlet; also 185 feet of 18″ tera-cotta pipe. Payments, $3,456.

Flushing-Chamber and Connections at Wissahickon Creek.

425 feet of sewer, 4′ 7″ diameter; arched but not plastered; foundation for flushing-chamber partly excavated; material on ground. Payments, $4,032.

Wissahickon Valley Sewer.

1,200 feet of this sewer has been arched and partly covered. Payments, $4,000.

Section 11 of the intercepting sewer, 1,666 feet long, was constructed during the most severe freezing weather, because it had to be built under the bottom of the canal and along the towing-path of the Schuylkill Navigation Company, while it was closed to navigation between Christmas and the fifteenth day of March. Although attended with great difficulty the work was successfully completed.

Of Section 10, 840 feet on Ridge avenue were built in tunnel, and a very substantial new stone dam was built across the Wissahickon creek, through which the sewer has been carried.

Excepting about 50 feet at Dobson's run, the brick and iron conduits are all laid for this important work, from Fairmount to Levering street, a distance of 31,000 feet, or nearly six miles. A branch for flushing the sewer from Wissahickon creek is nearly completed, and the sewer extension has been contracted for for 3,000 feet along the Wissahickon, to intercept the sewage from the west slope of Germantown.

4,300 feet of sewer are yet required to complete the intercepting sewer from Fairmount to Flat Rock paper mills, 2,300 feet of which are now under contract.

Main Sewers.

Dauphin street, from Twenty-fourth street to Sedgley avenue. This work was continued and completed and final estimate paid on April 20th. Number of feet built in 1885, 100; in 1886, 255; total, 355.

Sixteenth street sewer, from Snyder avenue to near Mifflin street. The final estimate was paid on February 9th, 1886.

Twenty-fourth street, from Dauphin street to York street. This work continued and completed. Final estimate paid April 20th. Number of feet built in 1885, 300; in 1886, 297; total, 597.

Mill creek sewer, on Sansom and Meadow streets. Work continued and completed. Final estimate not yet paid. Number feet built in 1885, 160; in 1886, 231; total, 391.

Annsbury street, across Fifth street. Work completed, and final estimate paid April 20th, 1886.

Sixteenth street sewer, from near Mifflin street to Wharton street. Work was commenced July 21st, and completed November 8th. Concrete invert blocks were used in this sewer. Length, 2,528 feet. Cost, $13,599.97.

Mill creek sewer, on Forty-seventh street and Brown street. This sewer extends on Forty-seventh street, from the old sewer

north of Aspen to Brown street, and on Brown street to Forty-eighth street, where it connects with the sewer built some years ago to carry Forty-eighth street over Mill creek. This sewer is circular, 15 feet in diameter, except where it curves from Forty-seventh street into Brown street, with a radius of 150 feet. On this curve the size of the sewer is increased to 156 feet high by 16 feet wide. Two ventilators and one well-hole have been built in connection with the sewer.

The old branch sewer on Brown street, east of Forty-seventh street, was extended to Forty-seventh street, and thence eastward to connect with the well-hole in the new sewer; the outlet of this sewer has long been a nuisance, as its contents were discharged into a shallow stream. This has been remedied by the connection above referred to.

The bottom of sewer under Forty-eighth street was raised and shaped to conform to the new sewer. Length of sewer, 470.07 feet. Length of new bottom in old sewer, 124 feet. Price per foot, $35.74. Price per foot, bottom, $12. Total cost, $18,288.30, of which $1,178.72 was paid in assessment bills.

Branch Sewers.

92,317.71 feet of egg-shaped sewers of brick, various sizes, and 4,539.67 feet of terra-cotta pipe sewers (a detailed account of which is given elsewhere) were built. A number of sewers were partially completed at the end of the year, having a length of 12,094.54 feet.

Manholes.

638 manholes were constructed, an average of one manhole for every 150 feet of sewer.

Inlets.

243 inlets were built in connection with the branch sewers of the following sizes: Two of No. 1, average cost each, $95; 109 of No. 2, average cost each, $86.29; 132 of No. 3,

average cost each, $80.28. One inlet was put in for every 398 feet of sewer built.

Inspection.

The cost of inspection for each lineal foot of branch sewers, including manholes, inlets, and well-holes, was 14 cents.

Inlets built in connection with old Sewers.

Two contracts were awarded for building brick and stone inlets, manholes and well-holes, during the year. The amount to be expended under the first contract was $7,000; under the second contract, $2,000.

The sizes, number built and cost (under first contract) was as follows: 5 No. 1, brick and stone, at $96.25, $481.25; 29 No. 2, brick and stone, at $87.45, $2,536.05; 45 No. 3, brick and stone, at $81.15, $3,651.75; 1 well-hole, 29 feet, at $5, $145; 2 manholes, at $25, $50; 127 feet of terra-cotta pipe, at $1.09, $138.43; total, $7,002.48. In excess of contract, $2.48.

Under the second contract, as follows: 1 No. 1, brick and stone inlet, at $106.75, $106,75; 8 No. 2, brick and stone inlets, at $97.25, $778; 10 No. 3, brick and stone inlets, at $88.50, $885; 22 feet of terra-cotta pipe, at $1.15, $255.30; total, $2,025.05. In excess of contract, $25.05.

The sizes and number of iron inlets built were as follows: 12 No. 2, iron inlets, at $105.50, $1,266; 1 No. 3, iron inlet, at $91, $91; 1 No, 3 Shedakar trap, at $65, $65; 76½ feet terra-cotta pipe, at 75 cents, $57.30; total, $1,479.37.

The brick and stone inlets were inspected at a cost of $686.66, or $7.38 for each inlet, and iron inlets at a cost of $100, or $7.10 per inlet.

Sewers built at Private Expense.

59 feet of egg-shaped and circular sewers of brick, and 10,529 feet of terra-cotta pipe sewers were laid at private cost during the year. They were inspected in the same manner

as the public sewers. Slants for house connections were inserted, and manholes built when necessary.

Office Work.

Office work consisted in preparing advertisements, schedules for use of bidders, notifying contractors to begin work, preparing contracts, making estimates, examining sewer assessment bills, signing and stamping them, indexing and arranging the accumulated papers, etc.

194 excess bills (to be collected by the city) are accounted for as follows: 146 served and paid, amounting to $4,689.36; 33 served and sent to Law Department for lien, $1,731.67; 14 served and unpaid, $747.04; 1 not served, $127.83; total, $7,295.90.

The amount of money returned to the city where the amount of assessment bills exceeded the cost of the sewers, was as follows: In 194 assessment bills, $7,295.90; in cash paid by contractors (to balance), $620.39; total, $7,916.29.

Inspection and Records.

An inspector is placed on each sewer when the brick work is commenced, and is required to be on the work at all times while it is in progress, and upon completion certify under oath that everything connected with the work has been properly done in accordance with the contract and specifications before the final estimate is delivered to the contractor. Daily reports of the condition and progress of the work and character of excavations is made to me, and the Assistant Engineer, John K. Little, gives constant supervision to the inspectors and outdoor construction.

Slants are put in opposite each lot and a record thereof made. The lines and levels for the sewers are furnished by the District Surveyors, in accordance with the official plans. The Surveyors also make out all the assessment bills and the final plans, which are placed on file in the Department and entered on the drainage maps. 175 of these plans of main and

branch sewers have been received and entered in the sewer reference books. 215 of the Inspectors' diaries and record books of progress have been filed and indexed; all of which are in frequent use. The entry of the location of each slant on large plans is greatly needed, but cannot be done with the present force.

The returns of drains and sewers built in the streets at private expense under the inspection of the Department number 46.

The gutter complaints received were 38, of which 11 were satisfactorily drained, 5 were dismissed as not subject to the provisions of the ordinance, and 22 are now pending.

The inspectors of sewer connections have been continuously on duty during the year. The result of their labors is shown by the following statement:

Inspected.		*Not Inspected.*		*Unaccounted for.*
By plumber inspectors,	1,953	South of Lehigh ave.,	31	7
By brickl'r inspectors,	96	North of Lehigh ave.,	63	0
	2,049		94	7

An examination of the table shows the want of an additional inspector for the northern part of the city.

In addition to former duties, the making of daily reports to the Board of Health, of all applications for connections with sewers has become necessary; these are of much value to the inspectors of plumbing; they increase the efficiency of the supervision authorized by the Act of Assembly.

In compliance with a resolution of the Board of Health to that effect, the granting of permits to others than registered plumbers has ceased; the names of all those registered being furnished by the Health office.

On the thirtieth day of October, George Sturges, the Recording Clerk, who had held that position since the organization of the Department in May, 1855, died suddenly from paralysis, and Edward H. Thompson was promoted to the po-

sition; William Calvert was appointed his successor as Sewer Register, and William T. McPhail was appointed Sewer Clerk. J. Milton Titlow continues in the position of Principal Assistant Engineer, and John H. Dyé as Registrar. In addition to the regular force of the office, a corps under the charge of George H. Paddock, Assistant Engineer, has been engaged in giving the lines and grades for the intercepting sewer and on stormwater sewer and connections; also for the Wissahickon valley sewer. Besides general superintendence of the work of the work of construction, they have extended the surveys from Harding's mill to Flatrock dam, including the location of the mills, canal, sluiceways, soundings, etc. Assistant Engineer Fred. J. Amweg, with a leveller and a rodman, has been especially employed on the construction of Market street bridge since September 8th.

With the work of the Department well systematized, the employees of the office have taken deep interest in the performance of their duties, and the universal perseverance and industry manifested has resulted in accomplishing an extraordinary amount of work, and the accumulation of large additions to the valuable records of the office, which entitles them to especial commendation.

The usual tables of details relative to work and expenses are herewith submitted.

Very respectfully,

SAMUEL L. SMEDLEY,

Chief Engineer and Surveyor.

Length and Cost of Sewers Built during the year 1886.

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells. No. feet.	Wells. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Aspen street, from Thirty-sixth to Thirty-seventh streets	2 ft. 3 in. x 1 ft. 6 in.	410.5	2	1	$87 00	2	$25 00	...	...	...	1 77	$863 58	...	$863 58	$26 90	Jas. Duffy	John McParland	1886 July 29.
Berks street, from Fourth to Sixth streets	3 ft. 0 in. x 2 ft. 0 in.	514.25	2	5	80 00	4	22 00	...	...	...	2 15	1114 48	$479 15	1593 63	...	George L. Deitz	W. H. Yoast	Apr. 13.
Brandywine street, from Nineteenth to Twentieth streets	2 ft. 6 in. x 1 ft. 8 in.	440.	...	...	...	3	25 00	...	...	...	1 84	884 60	...	884 60	154 89	George Moore	J. B. Foster	May 28.
Bainbridge street, from Seventh to Eighth streets	2 ft. 6 in. x 1 ft. 8 in.	450.	3	3	81 00	3	25 00	...	...	...	2 09	1072 77	177 23	1250 00	...	W. Penn Brown	John McParland	June 30.
Bainbridge street, from Tenth street eastward	2 ft. 6 in. x 1 ft. 8 in.	304.	3	2	81 00	2	25 00	...	...	...	1 99	305 67	511 29	816 96	...	W. Penn Brown	John McParland	June 30.
Boudinot street, from Cambria street to Kensington avenue	3 ft. 0 in. x 2 ft. 0 in.	789.75	...	...	...	6	25 00	...	...	...	2 09	1800 58	...	1800 58	142 92	J. P. Colebaugh	Helms & Burns	July 30.
Broad street, from Pine to Lombard streets	2 ft. 6 in. x 1 ft. 8 in.	340.	...	...	...	3	25 00	...	...	...	1 87	417 76	293 04	710 80	...	George McLean	Helms & Burns	Aug. 19.
Bambrey street, from Columbia to Montgomery avenues	2 ft. 3 in. x 1 ft. 6 in.	563.	3	1	81 00	4	25 00	...	...	...	1 99	1301 37	...	1301 37	41 68	W. Penn Brown	P. C. & T. McEntee	Oct. 13.
Benton street, from Market to Melloy streets	12-inch pipe	316.	3	2	81 00	3	25 00	...	...	...	2 37	756 50	229 42	985 92	...	George Moore	M. C. Hong	Oct. 19.
Bouvier street, between Berks and Montgomery streets	2 ft. 6 in. x 1 ft. 8 in.	259.	...	...	...	2	25 00	...	...	...	2 00	568 00	...	568 00	...	S. R. Franklin	D. & P. McNichol	Oct. 22.
Berks street, from Hancock to Palethorp streets	3 ft. 6 in. x 2 ft. 4 in.	200.	2	2	87 00	1	25 00	...	...	...	2 37	555 00	118 00	673 00	...	John G. Moore	Wm. A. Hendle	Nov. 5.
Berks street, from Seventh to Franklin streets	2 ft. 3 in. x 1 ft. 6 in.	198.	...	...	...	2	25 00	...	...	...	2 23	437 77	42 62	480 39	...	John G. Moore	Wm. A. Hendle	Nov. 10.
Baker street, from Green lane to Centre street	3 ft. 0 in. x 2 ft. 6 in.	452.	2	2	87 00	3	26 00	...	...	...	2 90	1170 14	389 66	1559 80	...	George Moore	Jno. M. Donnelly	Nov. 22.
Belton street, from Twenty-second street to Ridge avenue	2 ft. 3 in. x 1 ft. 6 in.	414.	...	...	...	3	25 00	...	...	...	2 13	776 46	180 36	956 82	...	John G. Moore	W. A. Hendle	Dec. 9.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Man-holes. No. built.	Man-holes. Cost each.	Well's. No. feet.	Well's. Per foot.	Well's. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Barker street, from Seventeenth to Eighteenth streets	2 ft. 3 in. x 1 ft. 6 in.	416.	3	1	$81 00	3	$25 00	...	...	...	2 31	$1107 50	$9 46	$1116 96	...	N. B. Beam	M. C. Hong	1886 May 20.
Broad street, west side, from Spruce to Pine streets	2 ft. 3 in. x 1 ft. 6 in.	511.	2	1	87 00	3	25 00	...	...	...	1 83	275 00	822 13	1097 13	...	George McLean	Thos. McCann	Aug. 30.
Broad street, east side, from Snyder avenue to Federal street	4 ft. 0 in. x 2 ft. 8 in.	45									4 72							
	3 ft. 6 in. x 2 ft. 4 in.	1328.50									2 92							Sept. 21.
	3 ft. 3 in. x 2 ft. 2 in.	2385.16	2	1	87 00						1 94					C. P. McCally	McGlue	
	15-inch pipe	94.	3	5	81 00	21	25 00	...	...	...	1 49	4994 81	6792 68	11787 49	...	John Abel, Jr.	McPague	
Bailey street, between Oxford street and Columbia avenue	3 ft. 0 in. x 2 ft. 0 in.	238.	...	...	...	3	25 00	...	...	...	2 09	572 42	...	572 42	...	W. P. Brown	P. C. & T. McEntee	Oct. 2.
Cambridge street, from Thirtieth to Twenty-ninth streets	2 ft. 3 in. x 1 ft. 6 in.	448.	...	...	...	3	25 00	...	...	...	2 20	1060 60	...	1060 60	$23 90	S. R. Franklin	John M. Mack	Dec. 24.
Commerce street, from Fourth to Fifth streets	2 ft. 3 in. x 1 ft. 6 in.	430.50	...	...	...	3	25 00	...	...	...	2 25	997 52	46 10	1043 62	...	Aldrm. Ruth	John M. Mack	May 26.
Coulter street, from Hancock to Cumberland streets	3 ft. 0 in. x 2 ft. 0 in.	157.	...	...	...	2	25 00	...	...	...	1 29	252 53	...	252 53	68 47	George McLean	McKerrigan, McGarrigle	June 12.
Camac street, from Norris to Diamond streets	2 ft. 3 in. x 1 ft. 6 in.	533.	3	1	81 00	4	25 00	...	...	...	1 90	1193 70	...	1193 70	281 30	W. P. Brown	P. C. & T. McEntee	Sept. 17.
Cuthbert street, from Nineteenth to Twentieth streets	2 ft. 3 in. x 1 ft. 6 in.	427.	3	1	81 00	3	25 00	...	...	...	2 00	1010 00	...	1010 00	80 50	N. B. Beam	T. P. Smart	Aug. 19.
Cambria street, from Reese to Fairhill streets	15-inch pipe	151.50	...	...	...	2	25 00	...	...	...	2 15	375 72	...	375 72	28	George L. Deitz	H. C. Eyre	Sept. 18.
Currant street, from Walnut to Locust streets	12-inch pipe	418.	3	2	81 00	4	25 00	...	...	...	2 37	841 25	411 41	1252 66	...	George Moore	M. C. Hong	Oct. 9.
Cross street, from Eighth to Ninth streets	3 ft. 0 in. x 2 ft. 0 in.	426.	3	1	81 00	3	25 00	...	...	...	1 90	965 40	...	965 40	82 97	George McLean	P. C. & T. McEntee	Oct. 18.
Cathedral street, from Fifty-first to Fifty-second streets	2 ft. 6 in. x 1 ft. 8 in.	616.	...	...	...	3	25 00	...	...	...	1 90	1245 40	...	1245 40	248 55	E. H. Sickels, F. J. Watt	John McParland	Nov. 10.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells. No. feet.	Wells. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Cumberland street, from Broad to Fifteenth street	3 ft. 0 in. x 2 ft. 0 in.	524.	3	4	$75 00	3	$23 00	...	...	...	2 18	$987 50	$523 82	$1511 32	.....	Joseph Hunter	M. P. Hong	1886 Dec. 17.
Cumberland street, from Cedar to Tulip streets	3 ft. 0 in. x 2 ft. 0 in.	714.	2	2	87 00	5	25 00	...	...	...	2 11	1661 93	137 28	1799 21	.....	George L. Deitz	W. B. M. Conklin.	Dec. 14.
Duval street, from present terminus northeast	12-inch pipe	224.42	.....	.....	.....	2	25 00	...	...	...	1 23	326 03	.....	326 03	347 23	George Moore	R. McGarrigle	May 20.
Dauphin street, from Eighth to Tenth streets	12-inch pipe	45.50	3	2	81 00	5	25 00	...	...	...	1 57	1665 16	167 11	1832 27	.....	F. J. Watt	B. F. Shelmire	June 23.
	3 ft. 0 in. x 2 ft. 0 in.	712.									2 07							
Dauphin street, from east of Second to Bodine streets	3 ft. 0 in. x 2 ft. 0 in.	661.33	3	4	81 00	3	25 00	...	...	...	2 20	1031 69	822 23	1853 92	.....	C. P. McCally	D. & P. McNichols.	June 3.
Dickinson street, from Fifth to Sixth streets	3 ft. 0 in. x 2 ft. 0 in.	427.25	3	1	81 00	3	25 00	...	...	...	2 20	1040 75	55 20	1095 95	.....	W. J. Davis	T. P. Smart	Sept. 18.
Dover street, from York to Herman streets	2 ft. 3 in. x 1 ft. 6 in.	248.	3	2	81 00	2	25 00	...	...	...	1 90	558 00	117 00	675 00	.....	W. J. Davis	Jno. M. Donnelly.	Oct. 19.
Eleventh st., from Susquehanna ave., to summit, south	2 ft. 3 in. x 1 ft. 6 in.	378.	.....	.....	.....	2	25 00	...	...	...	1 87	756 86	.....	756 86	152 48	George L. Dietz	W. A. Hendel	Apr. 28.
Eighth street, from Berks to Montgomery streets	2 ft. 3 in. x 1 ft. 6 in.	543.	.....	.....	.....	3	25 00	...	...	...	1 99	1155 57	.....	1155 57	310 40	S. Cox	John Noonan	June 12.
Eighth street, from 80 feet north of Green to Wallace streets	2 ft. 6 in. x 1 ft. 8 in	277.	.....	.....	.....	3	25 00	...	...	...	1 95	600 00	.....	600 00	40 28	George L. Deitz	W. A. Hendel	June 29.
Edward street, from Hancock to Second streets, thence to Germantown avenue	2 ft. 6 in. x 1 ft. 8 in.	565.	2	2	87 00	3	25 00	...	...	...	2 25	1169 37	328 38	1497 75	.....	Abrm. Ruth	H. C. Eyre	July 2.
Eleventh street, from Diamond to summit, north	2 ft. 3 in. x 1 ft. 6 in.	214.	.....	.....	.....	2	25 00	...	...	...	1 97	471 58	.....	471 58	93 17	George L. Deitz	W. A. Hendel	Aug. 20.
Eighth street, from Fitzwater to Baker streets	2 ft. 3 in. x 1 ft. 6 in.	128.	3	1	81 00	1	25 00	...	...	...	2 25	325 50	68 50	394 00	.....	W. P. Brown	Jno. M. Donnelly.	Dec. 4.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wellh'ls. No. feet.	Wellh'ls. Per foot.	Wellh'ls. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
																		1886
Filbert street, from Thirty-third street to a point 204 feet 10½ inches west	2 ft. 3 in. x 1 ft. 6 in.	82.				1	$25 00				1 83	$175 06		$175 06	$60 40	W. P. Brown	Jno. McParland	May 18.
Fairmount avenue, from Nineteenth to West streets	3 ft. 0 in. x 2 ft. 0 in.	202.				2	25 00				1 97	447 94		447 94	92 03	John Abel, Jr.	T. McEntee	May 18.
Fairmount ave., from Twenty-first to Twenty-second streets	3 ft. 0 in. x 2 ft. 0 in.	485.				4	25 00				1 97	554 75	500 70	1055 45		John Abel, Jr.	T. McEntee	May 25.
Filbert street, from Thirty-sixth to Centre streets, to Thirty-seventh to Warren streets	3 ft. 6 in. x 2 ft. 4 in.	750.	2	2	87 00	4	25 00				2 40	1405 44	668 56	2074 00		H. M. Smith	W. H. H. Achuff	June 2.
Fontaine street, from Seventeenth to Eighteenth streets	2 ft. 6 in. x 1 ft. 8 in.	435.				3	25 00				1 98	936 30		936 30	24 86	T. A. Brackney	Thos. McCann	June 3.
Fifth street, from Diamond to Susquehanna streets	3 ft. 0 in. x 2 ft. 0 in.	576.	3	1	81 00	4	25 00				2 11	1396 36		1396 36	166 51	C. R. Van Horn	H. Murray	June 8.
Franklin street, from Diamond to Norris streets	3 ft. 0 in. x 2 ft. 0 in.	544.				3	25 00				2 05	1190 20		1190 20	65	C. R. Van Horn	H. Murray	June 25.
Fifteenth street, from Tioga to Venango streets	2 ft. 6 in. x 1 ft. 8 in.	538.				3	25 00				1 87	1081 06		1081 06	318 94	H. M. Smith	T. McEntee	July 13.
Fifth street, from Somerset to Cambria streets	15-inch pipe	524.	3	1	81 00	5	25 00				1 61	1049 64		1049 64	445 88	J. P. Colebaugh	W. H. Yoast	Aug. 26.
Front street, from Christian street to Washington avenue	3 ft. 6 in. x 2 ft. 4 in.	740.	3	3	81 00	5	25 00				2 41	1811 74	339 66	2151 40		George Moore	A. H. Coon & Co.	Sept. 11.
Frankford avenue, from York to Otis streets	3 ft. 0 in. x 2 ft. 0 in.	836.	2	4	87 00	5	25 00				2 11	1833 29	403 67	2236 96		T. A. Brackney	F. P. Murray, Jr.	Sept. 29.
Fifty-second street, from Lancaster to Columbia avenues.	15-inch pipe	953.50									1 47					F. J. Watt	Jno. McParland	Oct. 28.
	3 ft. 0 in. x 2 ft. 0 in.	395.80									2 01							
	3 ft. 6 in. x 2 ft. 4 in.	978.50	2	7	87 00	10	25 00				2 40	1837 30	3567 30	5404 60				

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Man-holes. No. built.	Man-holes. Cost each.	Wells. No. feet. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Fifth street, from Christian to Carpenter streets	3 ft. 6 in. x 2 ft. 4 in.	490.	3	1	$81 00	3	$25 00	...	...	2 44	$1252 68	$118 92	$1351 60	.....	W. J. Davis	James Kane	1886 Nov. 1.
Fifteenth street, from Cumberland to York streets	2 ft. 6 in. x 1 ft. 8 in.	535.	3	2	81 00	3	25 00	...	...	2 50	1301 99	272 51	1574 50	.....	John Hunter	John M. Mack	Nov. 12.
Fiftieth street, from Haverford to Oregon streets	3 ft. 6 in. x 2 ft. 4 in.	735.5	2	3	87 00	4	25 00	5' 6" 5	$17 50	2 57	1630 46	638 27	2268 73	.....	F. J. Watt	J. McFarland	Nov. 12.
Fifth street, from Lombard to Bainbridge streets	3 ft. 0 in. x 2 ft. 0 in.	689.	3	3	81 00	4	25 00	...	...	2 39	665 96	1300 00	1965 96	.....	T. A. Brackney. / John Hunter	W. A. Hendel	Nov. 15.
Fitzwater street, from Seventh to Eighth streets	3 ft. 0 in. x 2 ft. 0 in.	445.	.....	.....	.....	3	25 00	...	...	2 23	1067 35	.....	1067 35	12 07	John McCormick	Thos. McCann	Nov. 29.
Girard avenue, from Taney to Twenty-seventh streets, and on Twenty-seventh to Mt. Pleasant streets	2 ft. 3 in. x 1 ft. 6 in.	758.	3	2	55 00	4	24 00	...	...	1 44	1297 52	.....	1297 52	102 07	S. R. Franklin	Geo. W. Hansell	June 29.
Green street, from end of sewer east of Linden street eastw'rd	2 ft. 6 in. x 1 ft. 8 in.	64.	.....	.....	.....	1	25 00	...	...	2 18	164 52	.....	164 52	28 79	M. McGrath	F. P. Murray	July 19.
Gratz street, from Norris to Berks streets	2 ft. 3 in. x 1 ft. 6 in.	545.	2 / 3	1 / 1	87 00 / 81 00	3	25 00	...	...	1 90	1278 50	.....	1278 50	110 96	C. P. McCally	Jno. M. Donnelly	Aug. 20.
Girard av., north side, between Frankford av. and Otis street	3 ft. 0 in. x 2 ft. 0 in.	2541.75	2	3	87 00	14	25 00	...	...	2 03	2915 03	2855 72	5770 75	.....	P. R. Van Horn	W. B. M. Conklin	Oct. 25.
Girard avenue, south side, from Frankford avenue to Eyre st., and from Montgomery avenue to Vienna street	3 ft. 0 in. x 2 ft. 0 in.	2066.33	2	6	87 00	12	25 00	...	...	2 07	2216 74	2882 56	5099 30	.....	J. P. Colebaugh	W. H. Yoast	Dec. 6.
Girard ave., north side, from Tenth to Second streets	3 ft. 0 in. x 2 ft. 0 in. / 2 ft. 3 in. x 1 ft. 6 in.	2929. / 676.	.....	.....	.....	21	25 00	...	...	2 07 / 1 93	2872 59	5020 12	7892 71	.....	P. R. Van Horn. / George L. Deitz	W. B. M. Conklin	Dec. 20.
Hope street, from Huntingdon street to Lehigh avenue	3 ft. 0 in. x 2 ft. 0 in.	581.	2	2	87 00	4	25 00	...	...	2 37	1317 00	333 97	1650 97	.....	C. P. McCally	M. C. Hong	June 19.

Length and Cost of Sewers Built during the year 1885—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Man-holes. No. built.	Man-holes. Cost each.	Welle's. No. feet.	Welle's. Per foot.	Welle's. Total cost.	Welle's. Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Payments. Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
																		1886
Huntingdon street, from Ninth street to Germantown avenue.	3 ft. 0 in. x 2 ft. 0 in.	508.	2	2	$87 00	5	$25 00	...	...	.....	1 90	$1044 27	$219 93	$1264 20	.....	C. R. Van Horn...	Jno. M. Donnelly...	July 7.
Hamilton st., from Lancaster av to west of Thirty-eighth st....	2 ft. 3 in. x 1 ft. 6 in.	427.	2	1	87 00	2	25 00	...	...	.....	1 69	858 63	.....	858 63	156 91	W. P. Brown.....	Jno. Noonan.....	July 8.
Hutchinson street, from Oxford street to Columbia avenue.....	2 ft. 6 in. x 1 ft. 8 in.	513.	.....	.....	.....	3	25 00	...	...	.....	2 05	1,26 60	.....	1126 65	156 35	E. H. Sickels.....	A. H. Coon & Co...	Oct. 16.
Hancock street, from Berks to Fitler streets.....	3 ft. 0 in. x 2 ft. 0 in.	468.	2	2	87 00	3	25 00	...	...	.....	2 27	1084 61	276 75	1811 36	.....	Jas. J. Moore.....	B. F. Sheimire.....	Oct. 23.
Howard street, from 68 ft. south of Diamond street to Susquehanna avenue.....	3 ft. 0 in. x 2 ft. 0 in.	895.	.....	.....	.....	5	25 00	...	...	.....	2 13	1605 35	.....	1605 35	27 75	Geo. L. Deitz.....	W. A. Hendel.....	Oct. 23.
Ingersoll street, from Twenty-fourth to Twenty-fifth streets..	2 ft. 3 in. x 1 ft. 6 in.	645.	.....	.....	.....	3	25 00	...	...	.....	2 00	965 60	.....	965 60	237 88	S. B. Franklin.....	G. W. Hansell.....	Sept. 4.
Judson street, from Brown to Parrish streets.....	2 ft. 6 in. x 1 ft. 8 in.	400.	3	1	81 00	3	25 00	...	...	.....	1 89	912 00	.....	912 00	8 00	H. M. Smith.....	T. McEntee.....	June 12.
Jasper street, from York to Taylor streets.....	3 ft. 0 in. x 2 ft. 0 in.	193.25	2	2	87 00	2	25 00	...	...	.....	2 00	375 76	234 74	610 50	.....	C. P. McCally.....	Jno. M. Donnelly.	July 30.
Jefferson street, from Bouvier to Seventeenth streets.....	2 ft. 3 in. x 1 ft. 6 in.	180.	.....	.....	.....	2	25 00	...	...	.....	1 72	359 60	.....	359 60	72 15	Jas. McGill.....	Jno. Noonan.....	Oct. 23.
Johnson street, from Twentieth to Twenty-first streets.....	2 ft. 3 in. x 1 ft. 6 in.	526.	2	1	87 00	4	25 00	...	...	.....	1 97	1223 22	.....	1223 22	149 06	Jno. McCormick...	Thos. McCann.....	Dec. 31.
Kensington street, from Somerset to "C" streets.....	3 ft. 0 in. x 2 ft. 0 in.	737.88	2	3	87 00	5	15 00	...	...	.....	2 17	1884 18	103 02	1987 20	.....	Geo. L. Deitz.....	Wm. A. Hendel...	Nov. 2.
Lawrence street, from Dauphin street to Susquehanna ave.....	3 ft. 0 in. x 2 ft. 0 in.	581.	3	1	70 00	4	21 00	...	...	.....	2 15	1403 15	.....	1403 15	55 22	J. P. Colebaugh....	W. H. Yoast.....	May 5.
Locust st., from Thirty-second street westward.....	12 in. pipe.....	231.	.....	.....	.....	2	25 00	...	...	.....	1 48	391 88	.....	391 88	226 05	N. B. Beam.....	J. McParland.....	May 14.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells. No. feet.	Wells. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
																		1886
Lawrence street, from 180 feet south of Lehigh avenue to 68 feet north of Huntingdon st.	3 ft. 0 in. x 2 ft. 0 in.	273.				2	$25 00				2 03	$348 00	$256 19	$604 19		J. P. Colebaugh	Thos. McCann	May 18.
Leithgow street, from Dauphin street to Susquehanna ave.	3 ft. 0 in. x 2 ft. 0 in.	605.	2	3	$87 00	4	25 00				2 22	1448 01	251 99	1700 00		C. P. McCally	H. C. Eyre	May 19.
Lombard street, from Broad to Fifteenth streets	2 ft. 3 in. x 1 ft. 6 in.	428.	3	1	81 00	3	25 00				1 90	867 56	101 64	969 20		T. A. Brackney	Thos. McCann	June 17.
Lawrence street, from Jefferson to Oxford streets	3 ft. 0 in. x 2 ft. 0 in.	533.66	3	2	81 00	3	25 00				2 16	1389 70		1389 70		Jno. McCormick	F. P. Murray, Jr.	July 19.
Locust street, from Sixteenth to Vaughn streets	2 ft. 3 in. x 1 ft. 6 in.	225.				2	25 00				2 12	527 00		527 00	26 50	Geo. McLean	Jno. Donnelly	Aug. 20.
Locust street, from Ninth to Tenth streets	2 ft. 3 in. x 1 ft. 6 in.	422.	3	3	81 00	4	25 00				1 86	857 00	270 92	1127 92		Geo. McLean	Thos. McCann	Oct. 9.
Lehigh avenue, from 285 ft. west of Leamy street to Leamy street, thence southward	3 ft. 0 in. x 2 ft. 0 in.	573.42				3	25 00				2 08	352 50	915 21	1267 71		Geo. L. Deitz	Jno. M. Noonan	Oct. 11.
Lehigh avenue, from Jasper to Kensington streets, and thence to Huntingdon street	3 ft. 0 in. x 2 ft. 0 in.	1112.50	2	2	87 00	6	25 00				2 09	2051 47	597 65	2649 12		Geo. L. Deitz, W. P. Brown	Jno. Noonan	Oct. 5.
Lehigh avenue, from Hutchinson st. to Germantown ave.	3 ft. 0 in. x 2 ft. 0 in.	398.	2	1	87 00	3	25 00				2 85	273 78	766 02	1039 80		C. P. McCally	Jno. Kerrigan	Nov. 14.
Lancaster avenue, from Fifty-third to Fifty-fourth streets	3 ft. 0 in. x 2 ft. 0 in.	500.	3	1	81 00	5	25 00				1 89	999 15	151 85	1151 00		F. J. Watt	Jno. McParland	Dec. 7.
Mervine street, bet. Thompson and Master streets	2 ft. 3 in. x 1 ft. 6 in.	378.				3	25 00				1 87	781 86		781 86	200 14	Geo. L. Deitz	W. A. Hendel	June 22.
Moore street, between Pearl and Emerald streets	3 ft. 0 in. x 2 ft. 0 in.	219.				2	25 00				2 13	526 17		526 17	1 03	Geo. L. Deitz	W. A. Hendel	July 13.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells. No. feet.	Wells. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Marlborough street, from Beach street to Delaware avenue	3 ft. 6 in. x 2 ft. 4 in.	293.	2	4	$87 00	1	$25 00	...	...	...	2 82	...	$1199 26	$1199 26	...	M. McGrath	H. C. Eyre	1886 Aug. 19.
Montgomery street, from Seventeenth to Eighteenth streets	3 ft. 0 in. x 2 ft. 0 in.	450.	...	...	...	3	25 00	...	...	...	1 89	533 48	392 02	925 50	...	S. R. Franklin	G. W. Hansell	Aug. 26.
Meredith street, from Twenty-fifth to Twenty-sixth streets	3 ft. 6 in. x 1 ft. 8 in.	461.	2	1	87 00	3	25 00	...	...	...	3 65	974 20	870 45	1844 65	...	S. R. Franklin	H. C. Eyre	Oct. 4.
Mulberry street, from Fifth to Sixth streets	12 in. pipe	434.75	3	1	87 00	4	25 00	...	...	...	2 15	762 72	352 99	1115 71	...	Jas. Duffy	M. C. Hong	Oct. 9.
Meadow street, from Mulberry to Paul streets, to Frankford avenue	5 ft. 0 in. x 3 ft. 4 in.	1014.	1 2	2 10	95 00 85 00						6 96				...	J. P. Colebaugh	W. H. Yoast	Oct. 22.
	3 ft. 6 in. x 2 ft. 4 in.	836.75	3	1	75 00	8	25 00	6	7	42 00	3 30	3148 54	7357 03	10505 57	...			
Moore street, from Eleventh to Twelfth streets	3 ft. 0 in. x 2 ft. 0 in.	446.89	3	2	81 00	3	25 00	...	...	...	2 40	1045 79	263 74	1309 53	...	Jno. McCormick	Thos. McCann	Nov. 22.
Morris street, from Broad to Sixteenth streets	3 ft. 0 in. x 2 ft. 0 in.	995.	3	7	81 00	7	25 00	...	...	...	1 85	1887 00	640 25	2527 25	...	E. Y. Shelmire	McNichol ..... Sweeney	Nov. 25.
Mount Pleasant street, from Twenty-seventh to Twenty-eighth streets	2 ft. 3 in. x 1 ft. 6 in.	545.	...	...	...	2	25 00	...	...	...	1 99	1130 57	...	1130 57	241 69	S. R. Franklin	P. C. & T. McEntee	Dec. 31.
Nassau street, from Twenty-fourth to Twenty-fifth streets	2 ft. 3 in. x 1 ft. 6 in.	430.	...	...	...	3	25 00	...	...	...	2 00	935 00	...	935 00	196 37	S. Cox	Jno. Noonan	May 18.
Nineteenth street, from Seybert to Thompson streets	2 ft. 3 in. x 1 ft. 6 in.	236.	...	...	...	2	25 00	...	...	...	1 89	496 04	...	496 04	6 46	Geo. L. Deitz	W. A. Hendel	May 31.
Ninth street, from Tasker to Cross streets	3 ft. 3 in. x 2 ft. 2 in.	163.50	3	2	81 00	1	25 00	...	...	...	2 17	336 00	170 79	506 79	...	Geo. McLean	T. B. Foster	Aug. 7.
Oxford street, from Broad to Sixteenth streets	2 ft. 6 in. x 1 ft. 8 in.	880.	3	2	81 00	6	25 00	...	...	...	1 93	1458 75	556 65	2010 40	...	Geo. L. Deitz	W. A. Hendel	May 31.
Oxford street, from Darien to Tenth streets	2 ft. 6 in. x 1 ft. 8 in.	572.	3	3	81 00	5	25 00	...	...	...	2 23	964 92	679 64	1643 56	...	F. J. Watt	M. C. Hong	July 2.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wells'ls. No. feet.	Wells'ls. Per foot.	Wells'ls. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Oxford street, from Frankford avenue to East Hope street	2 ft. 6 in. x 1 ft. 8 in.	399.50	2	2	$87 00	2	$25 00	...	...	...	2 08	$772 06	($262 92	$1034 98	.....	Jos. Hunter	W. B. M. Conklin	1886 July 22.
Oxford street, from Twenty-second street to Ridge avenue, and Twenty-fourth to Twenty-fifth streets	2 ft. 6 in. x 1 ft. 8 in.	648.	.....	.....	.....	4	25 00	...	...	.....	1 97	1276 56	.....	1276 56	278 19	Geo. L. Deitz	W. A. Hendel	Aug. 7.
Ontario street, from Twentieth to Twenty-second streets	2 ft. 6 in. x 1 ft. 8 in.	980.	3	2	81 00	5	25 00	...	...	.....	2 51	2977 83	850 00	2727 83	.....	S. R. Franklin	H. C. Eyre	Nov. 15.
Oxford street, from Seventeenth to Twentieth streets,	2 ft. 3 in. x 1 ft. 6 in.	472.	3	1	81 00	7	25 00	...	...	.....	1 94	2651 66	205 88	2857 54	.....	Jas. McGill	Jno. Noonan	Dec. 7.
	2 ft. 6 in. x 1 ft. 8 in.	869.																
Preston street, from Haverford street to Lancaster avenue	2 ft. 6 in. x 1 ft. 8 in.	496.20	.....	.....	.....	3	20 00	...	...	.....	1 90	1002 78	.....	1002 78	68 38	N. B. Beam	Jno. Noonan	Mar. 29.
Parrish street, from Twentieth to Corinthian avenue	2 ft. 3 in. x 1 ft. 6 in.	352.	.....	.....	.....	3	24 00	...	...	.....	2 00	679 73	96 27	776 00	.....	S. R. Franklin	G. W. Hansell	June 23.
Palethorp street, from Cumberland to York streets	3 ft. 0 in. x 2 ft. 0 in.	569.50	2	2	80 00	4	21 00	...	...	.....	2 17	1425 00	54 81	1479 81	.....	J. P. Colebaugh	W. H. Yonst	June 26.
Perkiomen street, from Wylie to Vineyard streets	3 ft. 0 in. x 2 ft. 0 in.	351.	.....	.....	.....	3	25 00	...	...	.....	2 00	777 00	.....	777 00	33	H. M. Smith	P.C.&T. McEntee	July 26.
Perot street, from Twenty-fifth to Twenty-sixth streets	2 ft. 6 in. x 1 ft. 8 in.	463.	.....	.....	.....	3	25 00	...	...	.....	3 43	1034 20	628 89	1663 09	.....	A. Ruth, F. J. Watt	M. C. Hong	Aug. 24.
Passyunk av., from Twelfth to Moore sts., and on Moore bet. Twelfth and Thirteenth sts.	3 ft. 3 in. x 2 ft. 2 in.	466.33.	3	3	81 00						2 08							
	3 ft. 0 in. x 2 ft. 0 in.	440.16	3	3	81 00	5	25 00	...	...	.....	2 08	1866 24	630 25	2496 49	.....	T. A. Brackney	Thos. McCann	Aug. 21.
Page street, from Sixteenth to Seventeenth streets	2 ft. 6 in. x 1 ft. 8 in.	417.	.....	.....	.....	3	25 00	...	...	.....	1 87	854 79	.....	854 79	154 55	W. P. Brown	Jno. M. Donnelly	Sept. 4.
Poplar street, from Sixth to Seventh streets	3 ft. 0 in. x 2 ft. 0 in.	432.	.....	.....	.....	3	25 00	...	...	.....	2 29	916 45	147 83	1064 28	.....	T. A. Brackney	P.C. & T. McEntee	Oct. 18.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wellh'ls. No. feet.	Wellh'ls. Per foot.	Wellh'ls. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Pine street, from Fifth to Sixth streets	2 ft. 3 in. x 1 ft. 6 in.	437.				3	$25 00				2 23	$1049 51		$1049 51	117 82	T. A. Brackney	P.C. & T.McEntee.	1886 Nov. 11.
Second street, from Arch street to Ledger place	2 ft. 6 in. x 1 ft. 6 in.	250.				2	35 00				3 97	594 59	$468 01	1062 60		J. Abel, Jr.	M. C. Hong	Mar. 20.
Second street, bet. Thompson and Master streets	2 ft. 3 in. x 1 ft. 6 in.	300.	3	1	$81 00	2	25 00				2 27	812 00		812 00	22 22	B. E. Hooven	W. B. M. Conklin.	Apr. 28.
Seventh street, from Huntingdon street to Lehigh avenue	3 ft. 0 in. x 2 ft. 0 in.	531.				4	21 00				2 04	1167 24		1167 24	71 96	J. P. Colebaugh	W. H. Yoast	May 13.
St. John street, from Canal to Poplar streets	18 in. pipe	308.				3	25 00				1 87	650 96		650 96	176 77	A. Ruth, Jas. Duffy	M. C. Hong	June 1.
Seybert street, from Twenty-third to Twenty-fourth sts.	2 ft. 3 in. x 1 ft. 6 in.	435.				3	24 00				1 75	833 25		833 25	257 37	Wm. Yetter, S. R. Franklin	G. W. Hansell	June 8.
Seventeenth street, from Tioga to Venango streets	2 ft. 3 in. x 1 ft. 6 in.	549.	2	1	87 00	3	25 00				1 87	1188 63		1188 63	20 84	H. M. Smith	T. McEntee	July 8.
Somerset street, from 68 feet west of Kensington avenue to Tusculum street	3 ft. 0 in. x 2 ft. 0 in.	471.83	2	4	87 00						2 13							
	2 ft. 6 in. x 1 ft. 6 in.	468.83	3	1	81 00	6	25 00				1 98	2090 29	412 55	2502 84		J. P. Colebaugh	W. H. Yoast	Aug. 3.
Stillman street, from Columbia to Montgomery avenues	2 ft. 3 in. x 1 ft. 6 in.	562.				4	25 00				1 87	1150 94		1150 94		Wm. Yetter	P.C. & T.McEntee.	Aug. 25.
Sixth street, from Cambria to Somerset streets	3 ft. 0 in. x 2 ft. 0 in.	565.	2	1	87 00	3	25 00				2 19	1480 00	35	1480 35		W. J. Davis	W. H. Yoast	Aug. 26.
Stiles street, from Carlisle to Fifteenth streets	2 ft. 3 in. x 1 ft. 6 in.	232.	3	1	81 00	2	25 00				1 90	459 67	112 13	571 80		E. H. Sickels	P.C. & T.McEntee.	Sept. 2.
Second street, from German to Monroe streets	3 ft. 6 in. x 2 ft. 4 in.	298.	3	3	81 00	2	25 00				2 29	677 88	279 66	957 54		Geo. McLean	Thos. McCann	Sept. 27.
Seventh street, bet. Arch and Cherry streets	2 ft. 3 in. x 1 ft. 6 in.	326.41				3	25 00				2 24	679 15	127 01	806 16		T. A. Brackney	T. McEntee	Nov. 29.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Man-holes. No. built.	Man-holes. Cost each.	Well'ls. No feet.	Well'ls. Per foot.	Well'ls. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Second street, west side, from Lombard to South streets	2 ft. 3 in. x 1 ft. 6 in.	352.	3	1	$81 00	2	$25 00	...	...	.....	2 00	$452 38	$382 62	$835 00	.....	T. A. Brackney	P.C. & T. McEntee	1886 Dec. 4.
Sixteenth street, from Dauphin to York streets	3 ft. 0 in. x 2 ft. 0 in.	527.	3	1	81 00	3	25 00	...	...	.....	2 17	1299 59	.....	1299 59	70 41	D. S. Rorer	D. Ryan	Dec. 11,
Seventh street, from Norris to Diamond streets	2 ft. 3 in. x 1 ft. 6 in.	513.	.....	.....	.....	3	25 00	...	...	.....	2 15	1177 95	.....	1177 95	261 88	Wm. May	Jno. M. Mack	Dec. 17.
Sixteenth street, from Susquehanna av. to Fontaine street	3 ft. 0 in. x 2 ft. 0 in.	771.	.....	.....	.....	5	25 00	...	...	.....	2 05	1616 50	.....	1616 50	.....	Jos. Hunter	Jno. M. Mack	Dec. 18.
Thirty-first street, from Master to Thompson, to Thirty-second streets	3 ft. 0 in. x 3 ft. 0 in. 2 ft. 3 in. x 1 ft. 6 in.	408. 361.	.....	.....	.....	8	25 00	31	5 155 00	3 49 3 25	.....	.....	2962 17	2962 17	.....	J. McGill	H. C. Eyre	Nov. 16.
Taney street, from Pennsylvania avenue to Brown street	3 ft. x 2 in	775.	2	1	79 00	5	23 00	...	...	.....	2 79	1621 66	734 59	2356 25	.....	F. J. Watt	W. H. H. Achuff	Mar. 29.
Twenty-second street, from Spring Garden to Brandywine streets	3 ft. x 2 in.	264.	3	1	80 00	2	24 00	...	...	.....	2 47	455 00	345 08	780 08	.....	C. R. Van Horn	M. C. Hong	Apr. 10.
Twenty-ninth street, from Poplar to Cambridge streets	3 ft. 0 in. x 2 ft. 0 in.	344.	3	2	81 00	2	25 00	...	...	.....	2 93	556 42	370 50	926 92	.....	J. Abel, Jr.	M. C. Hong	Apr. 26.
Twentieth street, from Market to Filbert streets	2 ft. 3 in. x 1 ft. 6 in.	405.	.....	.....	.....	3	25 00	...	...	.....	2 10	458 50	467 00	925 50	.....	N. B. Beam	Jno. Noonan	Apr. 27.
Thirteenth street, from Arch to Filbert streets	2 ft. 3 in. x 1 ft. 6 in.	360.	.....	.....	.....	3	25 00	...	...	.....	2 20	653 04	191 96	845 00	.....	S. Cox	D. & P. McNichol	Apr. 28.
Tyson street, from Eighth to Ninth streets, and on Ninth to Cumberland streets	3 ft. 0 in. x 2 ft. 0 in.	482.	2	2	87 00	4	25 00	...	...	.....	2 12	1129 49	166 35	1295 84	.....	J. P. Colebaugh	T. McCann	May 1.
Third street, from Brown to Poplar streets	2 ft. 6 in. x 1 ft. 8 in.	588.	.....	.....	.....	3	25 00	...	...	.....	2 35	1456 80	.....	1456 80	172 70	A. Ruth	T. McEntee	May 13.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Man-holes. No. built.	Man-holes. Cost each.	Wells. No. feet.	Wells. Per foot.	Wells. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
																		1886
Twenty-fifth street, from Perot to Meredith streets, thence to Twenty-fourth street	3 ft. 0 in. x 2 ft. 0 in.	547.	2	1	$87 00	4	$25 00	...	...	...	3 70	$1326 20	$901 11	$2227 31	.....	B. E. Hooven	W. B. M. Conklin.	May 17.
Twenty-second st., from Clayton to Brown streets	3 ft. 0 in. x 2 ft. 0 in.	600.	3	2	81 00	4	25 00	...	...	.....	2 15	676 11	863 89	1540 00	.....	John Abel, Jr.	M. C. Hong	May 19.
Third street, from north of Oxford street to Oxford street, thence to Bodine street	3 ft. 0 in. x 2 ft. 0 in.	421.58	3	1	81 00	3	25 00	...	...	.....	2 22	1023 70	68 20	1091 90	.....	C. Y. Lauderbach.	M. C. Hong	May 22.
Twenty-seventh street, from Master to Jefferson streets	2 ft. 3 in. x 1 ft. 6 in.	514.	.....	.....	.....	3	25 00	...	...	.....	1 94	1072 16	.....	1072 16	$0 15	S. Cox	F. P. Murray	May 26.
Third street, from Lehigh ave. to Somerset street	18 in. pipe	512.	2	1	87 00						1 39							
	3 ft. 0 in. x 2 ft. 0 in.	120.	3	1	81 00	6	25 00	...	...	.....	2 10	1275 00	6 68	1281 68	.....	J. P. Colebaugh	W. H. Yonst	June 8.
Twentieth street, from Chestnut to Sansom streets	2 ft. 3 in. x 1 ft. 6 in.	262.	.....	.....	.....	2	25 00	...	...	.....	1 89	545 18	.....	545 18	44 69	M. McGrath	J. B. Foster	June 23.
Tenth street, from Market to Chestnut streets	2 ft. 3 in. x 1 ft. 6 in.	520.50	.....	.....	.....	4	25 00	...	...	.....	2 15	.....	1219 07	1219 07	.....	Wm. May	John Noonan	Oct. 11.
Twenty-sixth street, from Sedgley avenue to York street	2 ft. 6 in. x 1 ft. 8 in.	1057.	3	4	81 00	6	25 00	...	...	.....	2 22	2318 45	500 00	2818 45	.....	M. McGrath	H. C. Eyre	Nov. 13.
Tasker street, from Broad to Sixteenth streets	3 ft. 0 in. x 2 ft. 0 in.	965.	3	6	81 00	6	25 00	...	...	.....	1 90	1855 00	614 50	2469 50	.....	E. Y. Shelmire	{ McNichol ..... } { Sweeney ..... }	Dec. 20.
Twenty-sixth st., from Columbia to Montgomery avenues	2 ft. 3 in. x 1 ft. 6 in.	488.	.....	.....	.....	3	25 00	...	...	.....	1 83	968 04	.....	968 04	219 96	T. A. Brackney	M. C. Hong	Dec. 31.
Thirty-seventh street, from Market to Filbert streets	3 ft. 0 in. x 2 ft. 0 in.	254.	2	2	87 00	2	25 00	...	...	.....	2 00	540 00	192 00	732 00	.....	W. P. Brown	J. McFarland	July 6.
Thompson street, from Norris to Ash streets	3 ft. 0 in. x 2 ft. 0 in.	434.	2	1	87 00	4	25 00	...	...	.....	2 21	897 82	248 32	1146 14	.....	John Hunter	W. B. M. Conklin.	Aug. 20.
Twenty-seventh street, from Oxford to Jefferson streets	2 ft. 3 in. x 1 ft. 6 in.	502.	.....	.....	.....	3	25 00	13	5	65 00	1 78	1033 56	.....	1033 56	.....	S. R. Franklin	D. Ryan	Sept. 15.

Length and Cost of Sewers Built during the year 1886—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manholes. No. built.	Manholes. Cost each.	Wellh'ls. No. feet.	Wellh'ls. Per foot.	Wellh'ls. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
Thompson street, from W. College av. to Twenty-sixth st	2 ft. 3 in. x 1 ft. 6 in.	177.				1	25 00				1 84	$152 73	$197 95	$350 68		James McGill	John Noonan	1886 Oct. 11.
Thirteenth street, from Norris to Diamond streets	2 ft. 3 in. x 1 ft. 6 in.	538.				4	25 00				2 10	1219 30		1219 30	271 62	W. P. Brown	P. C. & T. McEntee	Sept. 15.
Twenty-sixth street, from Ellsworth to Wharton streets	3 ft. 6 in. x 2 ft. 4 in.	978.	3	10	81 00	5	25 00				2 39	2013 45	1268 97	3272 42		James McGill	H. C. Eyre	Sept. 27.
Tioga street, from Frankford avenue to Aramingo Canal	4 ft. 0 in. x 2 ft. 8 in. 3 ft. 6 in. x 2 ft. 4 in. 3 ft. 0 in. x 2 ft. 0 in. 2 ft. 6 in. x 1 ft. 8 in.	492.08 616. 558.45 326.87	2	8	87 00	11	25 00				3 62 2 42 2 29 2 13	4217 14	2060 99	6218 13		B. E. Hooven	McGlue McTague	Oct. 8.
Twenty-seventh street, from Ellsworth to Wharton streets	3 ft. 0 in. x 2 ft. 0 in.	982.	3	8	81 00	7	25 00				2 08	1948 20	917 36	2865 56		James McGill	J. McParland	Sept. 28.
Twenty-eighth street, from Brown to Poplar streets	3 ft. 6 in. x 2 ft. 4 in.	851.	3	3	81 00	5	25 00	27	5	135 00	3 62	1886 29	1697 33	3583 62		Abrm. Ruth F. J. Watt S. R. Franklin	M. C. Hong	Oct. 8.
Wood street, from Seventh to Eighth streets	2 ft. 3 in. x 1 ft. 6 in.	412.	3	1	80 00	4	24 00				1 93	903 11	68 05	971 16		John Abel, Jr.	M. C. Hong	Apr. 13.
Walter street, from Seventeenth street, to 80 feet east of Eighteenth street	2 ft. 3 in. x 1 ft. 6 in.	335.				3	25 00				1 97	507 00	227 95	734 95		Jos. Hunter	W. B. M. Conklin	July 2.
Wyalusing street, from Lancaster avenue to Forty-fifth street, to Merino avenue	3 ft. 3 in. x 2 ft. 2 in. 2 ft. 6 in. x 1 ft. 8 in. 15 in. pipe	300. 360.50 345.	2	2	87 00	5	25 00				2 11 1 85 1 47	1601 06	505 01	2106 07		N. B. Beam	J. McParland	July 6.
Wallace street, from Thirty-seventh to Thirty-eighth sts	2 ft. 3 in. x 1 ft. 6 in.	408.	2	1	87 00	2	25 00	10'4"	5	51 66	1 80	923 06		923 06	50 60	W. P. Brown	John Noonan	July 22.
Wallace street, from Twenty-second street westward	2 ft. 6 in. x 1 ft. 8 in.	147.				1	25 00				2 07	81 35	247 94	329 29		Wm. Yetter	T. McEntee	Aug. 2.

Length and Cost of Sewers Built during the year 1886—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manholes.		Wells.			Cost per foot.	Payments.		Total cost.	Excess bills and balances.	Inspector.	Contractor.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet.	Per foot.	Cost each.		In assessment bills.	In city warrants.					
West College ave., from Girard avenue to Poplar street	2 ft. 6 in. x 1 ft. 8 in.	545.	2	1	$87 00	2	$25 00	...	...	...	2 53	$1308 36	$207 49	$1515 85	...	B. E. Hooven	W. B. M. Conklin.	Sept. 6.
Wood street, from Marshall to Seventh streets	2 ft. 6 in. x 1 ft. 8 in.	217.	...	...	...	2	25 00	...	...	...	2 28	524 49	20 27	544 76	...	W. P. Brown	P. C. & T. McEntee	Oct. 23.
Water street, from Pine to Dock streets	2 ft. 3 in. x 1 ft. 6 in.	663.	2	2	87 00	3	25 00	...	...	...	2 95	1648 90	555 95	2204 85	...	Geo. McLean	T. P. Smart	Nov. 22.
Wayne avenue, from School st. to Maplewood avenue	3 ft. 6 in. x 2 ft. 0 in.	390.	2	7	87 00	2	25 00	...	...	...	1 95	897 50	...	897 50	148 26	W. J. Davis	D. McMahon	Dec. 5.
Wiota street, from sewer in Baring street to Spring Garden street	2 ft. 3 in. x 1 ft. 6 in.	425.	3	1	81 00	4	25 00	...	...	...	1 90	937 27	51 23	988 50	...	F. J. Watt	J. McParland	Dec. 16.

Main Sewer Statement for 1886.

Location.	Diameter in feet.	Length in feet.	Price per foot.	Payment.		Total cost.	Contractors.
				In city warrants.	In assessment bills.		
Dauphin street, from Twenty-fourth street to Sedgley avenue	6½	255.	$19 50	$4,759 12	$603 38	$5,922 50	F. P. Deehan.
Sixteenth street, from Snyder avenue to north of Mifflin street				1,638 53	2,307 21	10,673 60	M. C. Hong.
Twenty-fourth street, from Dauphin to York streets	7	297.	16 80	4,946 46	1,051 14	10,929 60	James Sullivan.
Sansom and Meadow streets, from near Forty-sixth street to near Chestnut street	20 x 20	230.08	49 99	7,265 51	1,134 49	19,536 09	Michael O'Rourke.
Annsbury street, across Fifth street	15½ x 24			3,366 00		7,686 00	James Kennedy.
Sixteenth street, from north of Mifflin to Wharton streets	3½ x 5¼ 3⅝ x 5 5 x 4½ 2½ x 4¼ 2⅝ x 3½	672.05 450.25 450.31 450.18 502.00	6 75 6 00 5 50 5 00 3 25	7,858 66	6,241 31	13,599 97	John S. Dutton.
Forty-seventh and Brown streets, from the sewer north of Aspen street to the sewer at Forty-eighth street	15	470.07	35 74	17,109 58	1,178 72	18,288 30	Wm. H. H. Achuff.
New bottom in sewer under Forty-eighth street		124.00	12 00				
Total		3,902.11		$46,443 86	$12,516 25		

Length and Size of Branch Sewers, Egg-shaped, built during 1886.

Size.	5 ft. 0 in. x 3 ft. 4 in.	4 ft. 0 in. x 2 ft. 8 in.	3 ft. 6 in. x 2 ft. 4 in.	3 ft. 3 in. x 2 ft. 2 in.	3 ft. 0 in. x 2 ft. 0 in.	2 ft. 6 in. x 1 ft. 8 in.	2 ft. 3 in. x 1 ft. 6 in.
At public cost.....	feet. 1,014.00	feet. 1,887.08	feet. 10,788.25	feet. 4,834.49	feet. 43,922.87	feet. 17,011.90	feet. 23,765.91
At private cost.....	.....	.....	600.00	800.00	3,045.00	.....	854.00
Total.....	1,014.00	1,887.08	11,388.25	5,634.49	46,967.87	17,011.90	24,619.91

Circular Sewers.

Size.	6-inch.	8-inch.	10-inch.	12-inch.	15-inch.	18-inch.	3 feet.	2 feet.
At public cost.....	.....	.....	.....	1,669.87	3,391.75	308.00	406.00	.....
At private cost.....	150.00	678.00	475.00	7,560.00	988.00	678.00	353.00	260.00
Total.....	150.00	678.00	475.00	9,229.87	4,379.75	986.00	763.00	260.00

Total Length of Sewers Built during 1886.

Description.	Feet.	Miles.
Main sewers*.....	16,518.11	3.507
Branch sewers.....	108,951.92	20.635
Branch sewers (private cost).....	16,443.00	3.114
Total.....	143,913.03	27.276

* Including Intercepting and Storm-water Sewers.

Detailed Statement of Branch Sewers Built by the City in 1886.

Branch Sewers.				Brick and Stone Inlets.				Manholes.			Wellholes.			Payments.		Inspection.			
Length.		Excluding details.																Total cost, including all details.	Average cost, including all details.
Feet.	Miles.	Total cost.	Cost per foot.	Size.	Number built.	Total cost.	Cost each.	Number built.	Total cost.	Cost each.	Number built.	Total cost.	Cost per foot.	In assessment bills.	In city warrants.	Total cost.	Cost per foot.		
				1	2	$190	$95 00												
				2	109	9,406	86 29												
96,857.38	18.35	$215,208 56	$2 21	3	132	10,597	80 28	638	$15,688 60	$24 59	6	$466 16	$5 13	$181,036 87	$70,518 87	$15,256 28	.14	$285,216 75	$2 74

Size.	Average cost per foot excluding details.	Average cost per foot including manholes.	Average cost per foot including manholes & inlets.	Average cost per foot, including manholes, inlets, and wellholes.	Average cost per foot including all details.
Egg-shaped, 5 feet 0 inches x 3 feet 4 inches	$6 95	$7 05	$8 16	$8 17	$8 31
Egg-shaped, 4 feet 0 inches x 2 feet 8 inches	4 23	4 38	4 38	4 38	4 47
Egg-shaped, 3 feet 6 inches x 2 feet 4 inches	2 97	3 12	3 50	3 51	3 65
Egg-shaped, 3 feet 3 inches x 2 feet 2 inches	1 91	2 09	2 23	2 23	2 37
Egg-shaped, 3 feet 0 inches x 2 feet 0 inches	2 14	2 27	2 48	2 49	2 53
Egg-shaped, 2 feet 6 inches x 1 foot 8 inches	2 19	2 34	2 53	2 53	2 67
Egg-shaped, 2 feet 3 inches x 1 foot 6 inches	2 08	2 14	2 28	2 29	2 43
Circular, 3 feet diameter	3 49	3 79	3 79	3 99	4 13
Circular, 18 inches diameter	1 87	2 11	2 11	2 11	2 25
Circular, 15 inches diameter	1 53	1 74	2 03	2 03	2 17
Circular, 12 inches diameter	2 01	2 24	2 54	2 54	2 68

SECOND ANNUAL MESSAGE

OF

EDWIN H. FITLER,

Mayor of the City of Philadelphia,

WITH

ANNUAL REPORT

OF

LOUIS WAGNER,

Director of the Department of Public Works,

AND

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS

FOR THE

Year ending December 31, 1888,

ISSUED BY THE

CITY OF PHILADELPHIA, 1889.

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

OFFICERS

OF THE

Department of Public Works.

Director,

LOUIS WAGNER.

Chief Clerk,

HARRY W. QUICK.

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

Superintendent of City Ice Boats,

H. E. MELVILLE.

Chiefs of Bureaus:

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

Bureau of Highways.

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

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

Comparative Recapitulation of New Paving.

	1887.	1888.	
New paving	45,170.13	150,750.13	Linear feet.
Macadamizing (new)	8,669.00	1,466.98	" "
Grading	139,450.00	213,476.71	Cubic yards.
New footway paving		28,166.8	Square yards.
Repairs to paved streets	535,703.13	578,718.64	" "
Footways repaved	3,557.42	7,978.91	" "
Ditches repaved	9,120.	26,234.	
Gutter stone laid	11,860.00	15,295.00	Linear feet.
Crossing stone laid	20,919.78	35,583.00	" "
Tramway stone laid	2,880.56	106.00	" "
Curbstone reset	7,501.00	162,798.00	" "
Wooden trunks	1,981.00	4,387.5	" "
Brick and stone drains	578.5	467.00	" "
Gutters paved	7,809.00	750.00	" "
Hand railings		1,193.00	" "
Broken stone used	8,114.64	11,649.04	Cubic yards.
Macadamizing (resurfaced)		19,083.02	Linear feet.
Footway, curb, and railroad notices served	5,067	9,124	
Block gutters		1,466.98	Linear feet.

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

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

The receipts for the same years were as follows:

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

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

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

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

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

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

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

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

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

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

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

Summary of work done in Improved Pavements.

	1887.		1888.	
	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks	54,398.08	18,688.00	196,252.23	65,352.61
Asphalt blocks	1,587.00	1,054.00	34,464.00	16,629.00
Sheet asphalt			16,431.28	5,611.76
Vitrified brick	8,041.00	2,881.00	75,601.00	22,542.99
Macadamizing	22,666.00	8,669.00	4,229.96	1,466.98
Total	86,692.08	*31,287.00	26,958.47	†112,002.35

Replacing Cobblestone with Improved Pavement.

	1887.		1888.	
	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks	29,396.86	10,536.00	65,780.85	24,689.26
Sheet Asphalt	33,813.72	10,971.83	44,354.99	13,365.49
Vitrified brick	4,000.00	1,044.30	8,274.6	2,160.00
Total	67,210.58	*22,552.13	118,410.44	†40,214.76

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

†1888. Total amount of new paving 162,217.11 linear feet, equal to 28 miles, 4,377.11 linear feet.

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

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

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

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

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

Board of Highway Supervisors.

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

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

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

Transactions of the Board of Highway Supervisors

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

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

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

Receipts and Expenditures.

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

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

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

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

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

Bureau of Street Cleaning.

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

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

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

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

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

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

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

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

1887	$304,021 00
1888	441,514 50

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

Districts.	Cleaned.					Removed.			
	Squares.	Inlets.	Crossings.	Market houses.	Snow from fire plugs.	Number of dead animals.	Number of loads.		
							Dirt.	Ashes.	Garbage.
First	51,295	30,154	5,890	176	315	1,321	46,251	93,805	11,011
Second	57,159	31,862	39,716	622	385	2,811	46,484	79,287	16,277
Third	51,807	31,587	25,265	1,420	261	2,538	41,331	76,422	15,705
Fourth	113,643	69,243	66,028	.....	1,049	9,139	126,587	170,027	29,239
Fifth	46,551	32,286	67,154	.....	588	546	46,069	79,938	16,428
Total	320,455	195,132	205,043	2,218	2,598	16,355	306,722	499,479	88,660

Bureau of Surveys.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The main line of the intercepting sewer is finally completed.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* 1887 equal to 22.578 miles.

† 1888 equal to 32.879 miles.

DEPARTMENT OF PUBLIC WORKS,

Bureau of Surveys.

OFFICERS, 1888.

Chief Engineer and Surveyor,

SAMUEL L. SMEDLEY.

Principal Assistant Engineer—J. MILTON TITLOW.
Assistant Engineer—J. Kay Little.
Recording Clerk—Edward H. Thompson.
Sewer Registrar—William Calvert.
Sewer Clerk—William T. McPhail.

Draughtsmen:

George S. Connor,
Neville B. Craig,
Carl A. Trik,
Otto Riezler.

Stenographer and Type-Writer,
Joseph R. Scott,

Rodman.
Hugh Trik.

Janitor—Isaac Holland.

Registry Bureau.

Registrar,

JOHN W. FRAZIER.

Receiving Clerk—O. S. Stallman.

Draughtsmen:

Isaac E. Shallcross,
James H. Roberts,
Charles H. Ott,
William H. Wester,
Robert P. Green,
J. G. D. Craig.
George H. Mercer,
S. Crawford Smith.

Inspectors of Sewer Connections:

William S. Molineaux,
George W. Fox.

Inspectors of Sewer Construction:

John Abel, Jr.,
Newton B. Beam,
Theo. A. Brackney,
William Penn Brown,
Conrad F. Brown,
Francis G. Ballantine,
Salathiel Cox,
Samuel H. Collom,
David J. Davis,
James Duffy,
August Durr,
Samuel R. Franklin,
Joseph Hunter,
Thomas D. Hooper,
Edward C. Hill,
William J. Little,
Chas. Y. Lauderbach,
William May,
Chas. P. McCalley,
James McGill,
John McCormick,
George Moore,
John G. Moore,
Abraham Ruth,
Henry M. Smith,
Emerick H. Sickels,
Champney R. Van Horn
John Vicary,
Findlay J. Watt,
William Yetter.

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS,

DEPARTMENT OF PUBLIC WORKS,

FOR THE YEAR 1888.

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS,

DEPARTMENT OF PUBLIC WORKS.

For the year 1888.

Philadelphia, January 1, 1889.

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

DEAR SIR:—The annual report of the operations of the Bureau of Surveys for the year 1888 is herewith respectfully submitted, giving detailed accounts of receipts and expenditures, the construction of new bridges and sewers, the laying out of streets, and plans of lines and grades of streets, with topography and triangulation, the survey of building lots, and other work done by the District Surveyors and Regulators, and the operations of the Registry Bureau and sewer permit Registrar.

The appropriation of December 31, 1887, for 1888 was		$450,858 00
Balance of former appropriations		328,493 77
Additional appropriations during 1888:		
March 20, Items 31 and 33	$1,598 18	
March 20, Item 4, Surplus 1887	23,250 00	
July 2, Items 31 and 32	135,000 00	
October 22, Item 37	1,185 87	
November 7, Item 4	6,700 00	
November 6, Item 33	10,000 00	
December 24, Item 33	269 53	
		178,003 58
		$957,355 35
Transferred by ordinance November 6, 1888		15,565 12
		$941,790 23

Expended during 1888		569,568 93
Balance merging	$18,980 43	
Balance not merging	353,240 87	
		372,221 30
		$941,790 23

The receipts of the bureau from all sources during the year amounted to $26,236.45, an increase of $3,427.72. They were derived from the following sources:

For sewer permits, $17,058.00; for searches in Registry Bureau, $2,617.00; for sewer bills and balances, $5,384.24; and for copies of plans, certificates, etc., $1,177,21.

Engineering Bureau.

The Engineering Bureau has continued the study of several principal drainage areas commenced last year; the recommendations regarding the same are given in subsequent detail; the usual routine work of approximate preliminary estimates and sketches of bridges and sewers for Councils Committees, as well as a great amount of other work, including the preparation of contracts for sewers and bridges, making estimates for payments on account of the construction ot the same, and for their inspection, has exceeded by about 50 per cent. any past year.

Market Street Bridge.

The bridge proper under the principal contractor, R. A. Malone & Sons, was completed on April 20, 1888. The total cost, including engineering, incidentals, etc., being $284,663.63, of which $18,406.35 was paid by the Traction Company, making the cost to the city, $266,257.28. The removal of the temporary wooden bridge erected to the north in 1884, immediately followed, under contracts with D. S. Cofrode for removal of superstructure at $800, and with American Dredging Company for removal of the river piers at $1,200, both of which were completed on June 21, 1888, and charged to the appropriation for the new bridge, making the total amount expended on account of same, $268,257.28.

The portions of the iron work most exposed to the weather and smoke should be painted, and the paving on the footways overhauled during the early part of the coming year.

Proposed Bridge at Walnut Street.

The design prepared during the month of July by direction of ordinance of Councils, July 2, 1888, is now being considered by the Committee on Surveys, with the prospect of a favorable report at an early date. The elevation of the structure between the buildings of the Allison Manufacturing Company being the most difficult subject of adjustment.

Councils having appropriated $200,000 for commencing this work next year, it is important that the design be decided upon early in the year, so that the main piers upon which it is proposed to spend this money, can be commenced and completed in one season.

Kensington Avenue, K Street and Frankford Avenue Bridge.

The proposed bridges at Kensington avenue, K street and Frankford avenue for the purpose of avoiding grade crossings by passing those streets under the Pennsylvania Railroad, and for which an appropriation of $65,000 was made this year, were not constructed by reason of a difference of opinion between the city authorities and the officials of the railroad company as to what part of the total cost, except land damages, of this money should be applied jointly with the company.

Cobb's Creek Bridge.

Contracts have been awarded to I. H. Hathaway for the construction of a stone and brick arched bridge over Cobb's creek on Lansdown avenue, to be paid for jointly by the city and Delaware county. Also, for the extension of the iron bridge over the West Chester Branch of the Pennsylvania Railroad at Chester avenue, for the purpose of allowing persons to pass under the avenue to reach Forty-ninth street station. The work will not be commenced until next year.

Preliminary plans have been made for bridges on Girard avenue and at Second street, over the Philadelphia & Reading Railroad; it is proposed that the railroad company contribute towards their construction, which is now being considered, with the expectation of a satisfactory conclusion at an early date.

Church Street Bridge.

Church street bridge, Frankford, the dangers attending this grade crossing have during the year been removed by the construction of a bridge 50 feet span, by the Pennsylvania Railroad Company at their cost, and the city has graded and paved this and the adjoining streets. The cutting has been from 10 to 15 feet, damaging property heavily, which will have to be paid by the city. The amount is now being determined by a Jury.

Sixth Street Bridge.

The bridge at Sixth street to pass the same under the Pennsylvania Railroad, for which a contract was made with the railroad company in August is approaching completion, both abutments being finished. The city has provided drainage under the depression by building a very deep sewer southward to Clearfield street, passing under the Philadelphia & Reading Railroad.

Main Sewers.

Nearly all the main sewers authorized to be constructed and paid for out of the appropriation of $245,000 have been completed, or very nearly so, with the exception of the Somerset street sewer and the Bellfield avenue sewer, both of which could not be commenced for unavoidable reasons, the latter street not being dedicated to public use. Washington street sewer (Tacony) is about being commenced, and the Tasker street sewer will be at the opening of the next season. The distribution of the appropriation for main sewers was again delayed this year, not being available until June; it is very important for the interests of the city and the localities to be

benefited by the construction of these sewers that the sum for that purpose for the following year be apportioned not later than February, so that the Engineering Bureau will have sufficient time to prepare the works for contract and have them constructed in favorable weather.

Manayunk Intercepting Sewer.

During the year many of the mills and dye-houses along the line of the sewer have connected therewith, and much objectionable matter thus removed from the Schuylkill water supply.

While many of the mill owners know and appreciate and cheerfully comply with all the requirements and regulations of the bureau, others have not complied with the formal notice served upon them during November, 1887, to connect with the sewer. As soon as the new supervisors are appointed an inspection will be made, and the cases notified having objectionable drainage emptying into the river will be referred to the City Solicitor for prosecution.

The mills in Montgomery county opposite Manayunk should be required by the concentrated action of the municipal authorities and the State Board of Health to keep the objectionable matter out of the river.

From the apparent increase of the number of mills and dye-houses at this point, within the last ten years, it looks as if the production of a large part of the nuisance was being transferred from the north to the south side of the river, from the jurisdiction of the city to that of Montgomery county. It is highly important that this matter be not overlooked, but that some action be taken at once to check and eventually prevent it, or the city will still be menaced by deleterious drainage passing into the drinking water in close proximity to the points where it is pumped into the reservoirs.

Connections and Branches to the Intercepting Sewer.

This work, in order to extend the sewer ramifications to the village of the Falls of Schuylkill, Manayunk and German-

town, and to the individual houses and mills will require the attention of Councils for many years, in order that the purpose intended to be accomplished by the construction of the intercepting sewer may be fully carried out. After these branches are constructed, the property owners must be compelled to connect therewith and see that the rules established are being complied with, and that the sewage is kept out of the water course. This will require constant vigilance and attention and give ample occupation for the supervisors asked for this year.

During the year the surveys for the Wissahickon Valley sewer have been extended and located upon the ground on the northeast side of the creek to Allen's lane.

Mifflin Creek at Ridge avenue.

When the main line of the intercepting sewer was constructed in the vicinity of Falls Village in order to protect it from the scour of Mifflin creek, a storm-water conduit, 6 feet in diameter, was built to the northeast side of Ridge avenue, and connected with the old storm-water drain at that point. To continue this storm-water conduit on the projected line of Coulter street is intended in the future. It would pass under three brick houses fronting on Mifflin lane and upon the line of Coulter street. The old stone drain as now constructed is intended to take the flow of the creek, extends parallel with the lane about 220 feet beyond the end of the new conduit; a great part of it is supposed to be only two feet by four feet in cross-section, inadequate for the amount of rain water. It is out of repair and often obstructed, and is the cause of a nuisance on Ridge avenue, damaging property at this point after every heavy rain by flooding with muddy water and leaving a deposit of mud and sand on the street.

As this drain obstructs a natural water-course and is entirely upon private property, it is believed that the owners may be indicted for maintaining a nuisance, or other action at law sustained which will require them to rebuild the culvert of proper dimensions, or open the original water-course.

Territory requiring Restricted Drainage.

Under the influence of the construction of the new branches of the Pennsylvania Railroad to Chestnut Hill and Manayunk, a large extent of territory, draining into the water supply, in the northwestern part of the city, in the Twenty-first, Twenty-second, and Twenty-fourth Wards, is being rapidly covered by suburban residences.

Possibly the intercepting sewer and its branches may in the distant future, if desired, be extended to the remote districts northwest of Chestnut Hill and Roxborough, but not probably to that northwest of West Fairmount Park and east of Belmont Mansion. For the present these districts should be prevented from demanding or anticipating the construction of sewers by a general ordinance of Councils, so that persons building there would have ample notice of the fact that sewers will not be allowed which empty into the dam. The ordinance should also provide for maintaining the water-courses free from pollution other than the wash from natural causes.

This restriction should also include a number of small areas lying along the Wissahickon creek below the level of the sewer, or better, that they may be included within the limits of Fairmount Park by slightly extending its boundaries.

There are also two small areas near Oak Lane Station, on the North Pennsylvania Railroad, adjoining the Montgomery county line, which drain naturally northward into Saw Mill creek, through the same county, which are too low to be drained by gravity within the city limits. These should also be restricted and controlled.

Frankford Creek Drainage Area.

The territory of this drainage area within the city limits is the largest and most extensive, and therefore the most important in future expenditure that we have; therefore it should have the preliminary study that the subject deserves.

To give a comprehensive idea of the extent of this area, the

Wingohocking creek, northwest branch, includes a large part of the villages of Germantown and Mt. Airy, in the Twenty-second Ward, containing 5,380 acres; the Tacony creek, north branch, 14,400 acres, 9,700 acres of which lie in Montgomery County, and includes the villages of Chelton Hills and Jenkintown; the little Tacony creek and Tackawanna run, northeast branch, 4,470 acres, includes the villages of Frankford, Volunteertown, and Oxford Church, in the Twenty-third Ward, and the area draining directly in the Frankford creek, between the villages of Frankford and Bridesburg, 670 acres, making the total area 20,220 acres, or nearly 32 square miles, one-quarter the area of the whole city.

The territory is beautiful and rolling, with some sharp spurs and knolls generally rising gradually from tide water to 360 feet above city datum. The rectangular system of streets with grades have been projected over the whole of it, irrespective of the natural drainage channels, consequently if the drainage is to follow those artificial lines the construction will be needlessly expensive. Upon a great portion of this area, the lines and grades of the streets should be revised for drainage purposes, and the regulated water-courses that are to remain should be defined, and the sizes and grades of the main sewers determined. It is of the utmost importance for the city's interest that this work be given the attention it deserves.

The north branch of the Wingohocking creek passing through the village of Somerville east of Germantown, is a fair example. Here the sides of the valley are so abrupt that the main sewer must follow the line of the creek through private property and be inaccessible in the future, unless a street following the same be laid out and opened, requiring a revision of part of the city plan.

Another important subject to be considered before the sizes of the main sewers in this drainage area can be determined, is the question whether the city will not be required in its own defense to prevent the channel of Tacony creek from becoming

a future nuisance, by providing for carrying the sewage from this area of 9,700 acres, in Montgomery county, which is now being rapidly improved and populated.

Drainage Systems in the First and Twenty-sixth Wards.

The portions of these wards lying below Snyder avenue include an area two miles long and four miles wide, generally known as the "Neck" and now used as truck farms, but which is being rapidly buried under the deposit of debris of the population at the north. The greater portion of this district is below the level of high tide and will in future be filled in some ten feet, to raise it to a suitable elevation above tide for facility of drainage by gravity.

Being bounded on the south for two miles in length by League Island Navy Yard, precludes the possibility of discharging sewers into the Delaware, within that distance. The main sewers must therefore, in general, grade downward east and west from the middle of this section to discharge at least a mile away into the Delaware and Schuylkill rivers. The extensions of the Baltimore and Ohio and Pennsylvania railroads across this territory with their branch tracks to their piers on the river fronts, add to the complication.

As the main sewers in this area must be laid at the minimum grades, their sizes and location should therefore be definitely established in advance of the improvements upon the best lines and the grades of the proposed streets, which will require general revision, should be re-established in accordance therewith. If this is done, it will procure for the city in the future more satisfactory drainage and relieve her from future damages by reason of change in the grades of the located streets. The present topographical maps only cover about one-fifth of this section; they should be extended at the earliest dates to allow these suggestions being carried out. The main sewer now built on Sixteenth street, at Snyder avenue, empties into one of the natural water courses at that point which is occasionally the subject of complaint, although provisional connection

for sewage has been made for taking it to the Delaware river; as this sewage increases in quantity it will be necessary to extend the main sewer southwestward to the Schuylkill near Point Breeze.

Aramingo Canal Drainage.

Subsequent to the date of the appropriation of $75,000 made June 29, for the extension of the Somerset street sewer to the Delaware river, the location through the Richmond Coal Wharves, the property of the Philadelphia and Reading Railroad Company, did not receive the sanction of that company until it was too late in the season to put the work under contract. The amount of the appropriation also was a hindrance, it not being large enough to allow all the work upon their property being done the same season, so as to given them the least inconvenience. An additional appropriation of $100,000 having been made for next year, making the amount available $175,000, about half the amount required, there is encouragement for early relief from the intolerable nuisance arising from the old canal.

Inlets.

The inlets in general use are very well adapted for territory undergoing improvement around the heart of the city and the suburbs, being of moderate cost, large capacity and not easily obstructed, are objectionable in the most improved sections; the large openings are unsightly, the iron covers are difficult to maintain in place, and become smooth and therefore dangerous when worn. Their location on the street corners, while in position best adapted for taking the largest quantity of storm water, and therefore accomplishing their object with the least number, are for this reason an objection; the accumulated water being required to pass across the paths of pedestrians during a storm. They should be located opposite or near the house lines of street intersections, and also near the centre of the block, with small openings in the granite curb stone or

iron gratings in the gutter, or both, that would not attract notice. Being greater in number, they prevent accumulation of water and may be smaller in all parts of construction; the inlet openings would be similar to those around the City Hall, which simply show a notch in the curb stone, not observed by the people and are only found upon special examination.

Construction.

There has been a large increase in the work of construction, embraced in the following: two bridges, sixteen main sewers, one section of the intercepting sewer, two sections of Wissahickon valley sewer, two hundred and fifty branch sewers, forty sewers built at private cost, as follows:

Bridges.

Somerset street bridge, over the Richmond Branch of the Philadelphia & Reading Railroad, Twenty-fifth Ward. This bridge was completed in 1887; the final estimate was made in February, 1888.

Owing to delay in completing the work, the contractor suffered a deduction of $540. Contractors, Boller & McGaw. Inspector, Joseph Child. The actual cost to the city for the bridge was $23,271.25. Inspection was paid by the contractors.

Bridge over the Wissahickon creek, on the line of Ridge avenue, in the Twenty-first Ward. This work, which was partially completed in 1887, was continued and completed on August 23, 1888. The final estimate was made November 26, 1888, in which a deduction for delay of 207 days at $10 per day was made.

Contract price	$33,300 00
Deduction for delays	2,070 00
	$31,230 00
Cost of inspection	743 32
Total cost of bridge	$31,973.32

Contractor, James Deehan. Inspector, Thomas Cooper.

Main Sewers.

The three following main sewers were completed in December 1887, but the final estimates were not drawn until January, 1888.

Heiskel street and Bellfield avenue: John S. Dutton, contractor; final estimate, $5,412.90.

Mill Creek sewer, between Forty-seventh and Haverford street, William H. H. Achuff, contractor; final estimate, $5,546.66.

Willow, Price and Engel streets: William H. H. Achuff, contractor; final estimate, $1,485.67.

The work on Mill Creek sewer, on Meadow street, between Chestnut and Market streets, Twenty-seventh Ward, was continued and completed; its length is 409 feet, costing $24,437.75, of which $19,734.13 was paid during 1888. Contractor, Peter Deehan; Inspector, H. M. Smith.

Bridge street sewer, between Frankford creek and Torresdale avenue, Twenty-third Ward, was built for a distance of 708 feet, 4 inches. This sewer is circular in shape, with a diameter of 4½ feet; the cost was $12.00 per foot, amounting to $8,500. Assessment bills, amounting to $904.65, were collected by the city. Contractor, William H. H. Achuff; Inspector, H. M. Smith. An additional appropriation was made for this sewer and the work was continued to a point near the Trenton Railroad, a length of 1,213 feet, 2 inches, costing $12,050.25, of which $2,189.20 was paid in assessment bills. Contractor, William H. H. Achuff; Inspector, H. M. Smith.

Westmoreland and Jasper street sewer was commenced at Gunner's run and Westmoreland street, and extends northwest on Westmoreland street to Jasper street, of circular shape, having a diameter of 8½ feet, thence southwest on Jasper street to the south side of Allegheny avenue, circular in shape, diameter of 4¼ feet; a branch having a diameter of 7 feet extends northwest on Jasper street from Westmore-

land street, a length of $194\frac{4}{10}$ feet, and another branch 3 feet in diameter extends northeast from Jasper street on Westmoreland street, a distance of $63\frac{67}{100}$ feet.

These branches are connected with the Westmoreland street sewer by means of a large chamber. Contractor, W. H. H. Achuff; Inspector, H. M. Smith.

The sewer on Jasper and Clearfield streets is a continuation of the above and extends on Jasper street from Allegheny avenue to Clearfield street, thence to Kensington avenue. This sewer has a diameter of $4\frac{1}{4}$ and 4 feet. Contractor, H. F. Sullivan; Inspector, H. M. Smith.

The sewer on Bainbridge street was built between the Schuylkill River, East Side Railroad and Schuylkill avenue, a distance of 453 feet. It is $3\frac{1}{2}$ feet in diameter and cost $4,824.45. Contractor, H. C. Eyre; Inspector, F. J. Watt.

Powelton avenue sewer connects the Twenty-fourth street sewer and the Schuylkill river, and is intended to relieve the sewers in the vicinity of Twenty-fourth and Wood streets, which were overcharged in times of heavy rainfall, causing much damage to the surrounding property. The sewer has a diameter of 8 feet and a length of 527 feet. Contractors, R. A. Malone & Co.; Inspector, Salathiel Cox.

Clearfield street, from Fifteenth street to Woodpecker lane, is almost completed. It has a diameter of 7 feet. The old portion of the sewer between Fifteenth and Sixteenth street was taken out in order to secure greater depth and increased size. Payments during 1888 were $10,584.00. Contractors, R. A. Malone & Co.; Inspector, John Abel, Jr.

The Centre and Engel streets sewer has been completed. It consists of 256 feet of circular sewer, 4 feet in diameter, and 106 feet of 3 feet in diameter, costing $4,871.50. Contractor, Chas. J. Kennedy; Inspector, S. H. Collom.

The Reed street sewer is circular, with a diameter $4\frac{1}{2}$ feet, and extends from the Schuylkill river to the Baltimore & Ohio Railroad. Its cost was $9,587.70. Contractor, T. P. Smart; Inspector, F. J. Watt.

The sewer on Aramingo street from Ann street southward, consists of a wooden trunk, 6 feet high and 12 feet 4 inches wide; its length is 465 feet, cost $4,636.05. Contractor, D. A. Kennedy; Inspector, H. M. Smith.

Lombard street sewer was extended from 122 feet west of Eighth street to 247 feet west of Ninth street, a total distance of 571 feet, costing $10,278.00. It is egg-shaped 4′ 6″ x 6′ in diameter. Contractor, James Deehan; Inspector, E. H. Sickels.

Fifty-second street sewer from Monroe to Lancaster avenue is rapidly approaching completion; it has a diameter of 7 feet 3 inches. The payments during 1888 were $17,604.00. Contractor, H. F. Sullivan; Inspector, H. M. Smith.

Snyder avenue sewer from Commercial avenue eastward is nearly completed; it is 8 feet in diameter. Payments during 1888, $6461.60. Contractor, John S. Dutton; Inspector, Abraham Ruth.

Clearfield street sewer from Ninth street to Connecting railway has been completed from Ninth street to a point near Germantown avenue. This sewer has diameters of 8′ 6″, 8′ 3″ and 8 feet. Payments during 1888, $6,624.00. Contractor, W. H. H. Achuff; Inspector, C. R. Van Horn.

Intercepting Sewer.

SECTION 13, extending from Leverington street northwestward, was constructed and completed. It consists of 2,315 feet of egg-shaped sewer (3′ 7″ x 2′ 10″) and one flushing chamber, altogether costing $32,479.

This completes the intercepting sewer, proper. We have now a continuous sewer from a point in the Schuylkill river below Fairmount dam to the American Pulp Works, Manayunk. Contractor, James Sullivan; Inspector, C. Y. Lauderbach.

Wissahickon Valley Sewer.

This is one of the branches of the intercepting sewer, projected for the drainage of the western portion of Germantown and vicinity.

SECTION 2. Work was commenced on this section during the winter and completed in April. It has a length of 2,555 feet of sewer (2′ 4″ x 3½′) and cost $23,100.00. Contractor, W. H. H. Achuff; Inspector, C. R. Van Horn.

SECTION 3. This section was awarded to H. Eyre. Work was begun in November, and at the close of the year 140 feet of sewer, size 2′ 4″ x 3′ 6″ had been completed. Work on the sewer will be continued during the winter. Inspector, F. J. Watt.

Flushing Chamber.

The final estimate for flushing chamber and connections with intercepting sewer along the Wissahickon creek, north of Ridge avenue, was made February 14, 1888, amount $2,356.86.

Branch Sewers.

During the year 149,765.83 linear feet of branch sewers wers constructed, as follows:

Egg-shaped sewers of brick	129,358.98	lin. feet.
Circular sewers of brick	5,937.13	"
Terra-cotta pipe sewers	14,469.72	"

a detailed account of which is appended to this report.

Man-holes.

In connection with these sewers, 1,014 manholes were built, an average of one man-hole for every 147 feet of sewer.

Inlets.

In addition to the man-holes, 446 inlets were built for the disposal of storm-water, as follows:

Size No. 1	3
Size No. 2	141
Size No. 3	302

Well-holes.

When necessary to connect sewer of different depths, well-holes were constructed.

Number built, 13, representing 384 vertical feet.

Expenditures.

The actual expenditures for the construction of branch sewers, inlets, man-holes, well-holes and inspection was $498,553.95, as follows:

To contractors in assessment bills	$329,561 93
To contractors in cash	148,767 40
	$478,329 33
For inspection	20,224 62
Total	$498 553 95

The amount retained from contractors for damages for delays was $340; for repaving over sewer ditches (work done by Bureau of Highways), $448.34; total, $788.34.

The amount paid by contractors to balance accounts was $554.04.

Repairs to Cohocksink Sewer.

The work of repairing Cohocksink sewer, between Broad and Dauphin streets, and Second street and Germantown avenue, was continued under John S. Dutton's contract.

The amount expended was $4,471.22. A further inspection of the sewer showed that additional repairs were necessary, and on October 30, 1888, a contract limited to $4,400 was made with H. S. Hong for a continuation of this work. Up to the end of the year estimates have been made on account of this contract, amounting to $1,302.40.

A large and dangerous break having occurred at Second street and Germantown avenue, requiring a speedy remedy and a large expenditure of money, a supplemental contract was made with H. S. Hong, amounting to $4,600, which was the unexpended balance of the item for repairs to main sewers.

Sewers Built at Private Expense.

Three thousand nine hundred and fifty-seven (3,957) feet of egg-shaped sewers of brick, and 6,167 feet of terra-cotta pipe were built at private cost during the year.

Inlets.

Inlets built in connection with old sewers.

The final estimate under M. C. Hong's contract of 1887, amounting to $1,265.13, was paid.

To H. C. Eyre was awarded the contract for Shedaker trap inlets. He constructed the following:

16 No. 2 Shedaker traps, at $77.50	$1,240 00

W. P. Clements was awarded the contract for brick and stone inlets as follows:

1 No. 1 brick and stone inlet at $98.00	$98 00
22 No. 2 brick and stone inlets at $88.00	1,936 00
32 No. 3 brick and stone inlets at $82.00	2,624 00
293 feet 12-inch terra cotta pipe at $1.10	322 00
	$4,980 00

Under contract with D. M. Smart, the following brick and stone inlets were constructed:

6 No. 2 brick and stone inlets at $84.00	$504 00
17 No. 3 brick and stone inlets at $81.00	1,377 00
45 feet 15-inch terra-cotta pipe at $1.35	60 75
	$1,941 75
Payments during 1888	641 40
Balance due	$1,300 35

The total length of sewers built and inspected during the year was $32\frac{879}{1000}$ miles, divided as follows: Main sewers, $2\frac{190}{1000}$ miles; intercepting sewer and connections $\frac{407}{1000}$ miles; branch sewers, $28\frac{365}{1000}$ miles; branch sewers, at private expense, $1\frac{917}{1000}$ miles.

The whole number of inlets constructed, including those built in connection with old sewers, was 540, as follows:

Shedaker traps	16
No. 1 brick and stone	4
No. 2 brick and stone	169
No. 3 brick and stone	351

Office Work.

The work required to be done in the office was augmented over that of former years, owing to the greater number of sewers authorized and built, for which contracts have been made. Over three hundred contracts were prepared, requiring three hundred letters in duplicate for the use of the Director and City Solicitor. Each contract also requires two letters to be written to the contractor, one to execute the contract, the other to commence work. Thirteen thousand sewer bills have been examined, stamped, and signed. Three hundred estimates for sewers were made.

The usual routine of the office, keeping the records, preparing the schedules, giving information to the public and contractors, advertising, etc., received prompt attention.

Sewer Connections.

Permits for the connection of 4,264 buildings were authorized during the year, each and every building being separately connected with the sewer (an important regulation of the Board of Health). This involved the issuing of 2,758 permits, with their corresponding inspection, draughting, and return of the reports as required by the ordinance of April 3, 1883.

The Bureaus of Water and Highways, and the Board of Health have been furnished daily with a list of all permits issued.

Two hundred and fifty (250) plans of main and branch sewers were received from the District Surveyors, and duly entered in the sewer reference book, and have been carefully plotted on the drainage maps.

Forty (40) sewers authorized by the Board of Surveyors and Committee on Surveys were constructed at private expense.

The indexing of the inspectors' books has been continued, the number received during the year was 237, making the total number now in constant use 912.

The work of inspecting the connections of drains with the sewers has greatly increased, and it has taxed to the utmost the vigilance and efficiency of the inspectors. They have been continuously on duty during the year, and it has been impossible for them to inspect the connections made in the outlying districts, viz: Frankford, Germantown, etc. Sixty-three (63) connections were made with the Manayunk intercepting sewer, all of which were under the supervision of the inspector on that sewer.

The returns of sewer connections have been received, but remain as turned in by the inspectors, there being no opportunity to properly index or even arrange them.

All moneys for permits, balances, etc., were collected in this office and returned to the City Treasurer daily, taking his receipt therefor, previous to June 1, 1888; on and after which date the arrangements of the new charter were put into operation, and the payments have all been made in the office of the Receiver of Taxes. The applicant for a permit now takes a memorandum of the amount to be paid to the Receiver of Taxes, who receives the money and returns the receipt to this office by the party paying.

Board of Surveyors and Regulators.

The District Surveyors now serving under the provisions of the new charter are

Thomas Daly, First District, appointed April 4, 1887.

C. A. Sundstrom, Eighth District, appointed September 1, 1888.

Joseph Johnson, Eleventh District, appointed April 1, 1888.

H. M. Fuller, Thirteenth District, appointed February 1, 1888.

Under the conditions of the appropriation, the fees, including work done for any department, bureau, board or commission of the city, must amount to the salaries, over and above

the expenses of the office. How far these conditions are admissible, can only be determined after longer experience than has hitherto been afforded.

An appended table exhibits the relative earnings and expenses for the year 1888; and, also, the number of lots surveyed and other work performed in each district, for the city, by the District Surveyor.

The Board of Surveyors held twenty-seven meetings, five of which were road days, set apart for the hearing of parties interested in revision of plans. Fifty-two (52) plans were so heard during the year. The Recording Clerk keeps the minutes of this body, which now comprises several volumes, and their value to the public can hardly be over-estimated. A fair copy made to date, and a complete index, are greatly needed. He also attends on and keeps the minutes of the Committee on Surveys, which, during the year, held 31 meetings, when 637 ordinances, petitions and communications were considered, and 126 reports were prepared for Councils, as follows: For sewers, 248: new streets, 54; revisions of plan, 32; bridges, 3; miscellaneous, 19. Eighty-five (85) complaints of objectionable footway gutters were received, and owners of property notified. Of these, 49 complied, 31 are now pending, and 5 were dismissed as not coming under the law.

Topographical surveys have been made east of Broad street, in the Twenty-second Ward, to the extent of 372 acres; in the Twenty-third and Twenty-fifth Wards, 1,710 acres, and in the Twenty-seventh Ward, 385 acres. These includes the territory along the line of the Aramingo canal, and will enable the Board of Surveyors to proceed with the revision of grades authorized there by ordinance of Councils.

Eight thousand and three (8,003) lots have been surveyed by the District Surveyors.

Standard Measures.

A permanent station has been established in the centre of City Hall tower, and very accurate triangulations made in

connection with the United States Coast and Geodetic Survey, by which its latitude is found to be 39° 57′ .09.768″ north, and longitude 75° 09′ 49.916″ west. From stations in the middle of Broad street, 30,575.71 feet, north, and at the Navy Yard, 24,779.24 feet, south, and another station at Sixty-fifth street, in the middle of Market street, distance 24,779.24 feet; the true angle of Broad and Market streets on the northwest is found to be 90° 19′ 48.56″. These streets were intendeded by the original laying out of the city to be at right angles, but the variation above noted by measures of extreme accuracy, show that at Sixty-fifth street, Market street is 142.8 feet more south than if the right angles had been properly laid off; and all the other city streets are out of right angles in the same proportion. The angles of other important stations in the city have been accurately determined, and the centre lines of the east and west streets, between Market street and South street, because of the obstructions and hindrances of daylight, have been run out at night for the purpose of more definitely and permanently securing the true location of the streets in the "Old City Proper," where land has become so immensely valuable as to make the minutest accuracy imperative.

Registry Bureau.

More work has been done in the Registrar's Department of the Bureau of Surveys during the year just ended than during any single year since the Registry office was established. This was made necessary for several reasons, the chief of which were:

First. Because of the rule established by Director of Department of Public Works that no municipal improvements should be made in any street until the same had been legally opened to public use.

Second. Because of the opinion of the Supreme Court of Pennsylvania in the Brooklyn street case, deciding that the sale of lots fronting on a street did not constitute a dedication.

Third. Because of the absolute necessity for the renewal of the worn-out city plans, and the demand made upon the Registrar by heads of Bureaus for plans, tracings, etc.

Previous to the year 1888 it was the custom of the Bureau of Water to lay water-pipe in any street where the applicant made pre-payment of the amount fixed by law for laying such pipe, but that rule having been abrogated by reason of the decision in the Brooklyn street case, the Chief of the Bureau of Water made it imperative that no water-pipe should be laid in any street until a certificate was first furnished by the Registrar of the Bureau of Surveys that the street had been legally opened to public use, and the Director of Public Works having applied the same rule to the laying of gas-pipe and all other street improvements, you will therefore observe that while 879 certificates of the legal opening of streets were issued during the year 1887—by far the largest number ever issued in a single year up to that time—by reason of this new departure, 2,739 certificates of street openings were executed during the year 1888, or three times as many as were issued during the year 1887.

Under date of February 21, 1888, the City Solicitor wrote to the Director of Public Works, as follows, respecting the dedication of streets to the public use:

"In re-opening of Brooklyn street, the Supreme Court has just decided that where a street is plotted on the public plan, but not opened or in use, that the mere sale of lots bounded by the street calling for such plotted street as a front or boundary does not work a dedication to public use, and that in such case, when the street is opened by law, the original grantor of the property, so described, is not stopped from claiming damages from the city, if he has suffered any.

"In view of this decision, which reverses the decisions of the lower Courts in Berks and Story streets, we think it is proper to suggest to you that no municipal work be done until the streets are legally opened under an ordinance of Councils, or proceedings in Courts, or by deeds of dedication delivered to the city and recorded."

Since that time the Department and Bureaus have only issued certificates in accordance therewith.

Certificates of the legal opening of streets, up to that time, were based upon the coloring in reference atlases, which was the result of twenty-five years labor. By that system the work of certification could be done quickly and accurately; but as fully one-third of the streets indicated in these atlases as legally opened, were by virtue of sales of lots bounded by the streets, these reference atlases became entirely worthless for the certification of streets legally opened to public use, and the Registrar was therefore compelled to make a careful examination of the "Road Docket Record Book," copied from the Quarter Sessions records, and the public plan, covering the street, in every case where a certificate was called for, respecting the opening of streets.

The work of preparing new reference or index atlases was begun soon after the promulgation of the Brooklyn street decision, and at the close of the year, fully one half of all the streets in the city were properly indexed as regards their dedication to public use; this required a most careful examination of all the deeds of dedication, orders of Court, of Governors of the Commonwealth, agreements, releases on file in the Bureau, and of plans recorded in the Recorder of Deeds office, etc., covering a period of 150 years and upwards, and the work of indexing is still being pushed forward as rapidly as possible.

The constant use of street plans for 30 years and upwards, their being used so much in Court, and before Road Juries, as evidence, have had the effect of completely destroying some of them so that they could be used no longer, and copies have been prepared.

The Registrar soon after entering on his duties, reached the conclusion that plans made at the cost of Telephone, Electric, and other companies for submission for the action of the Board of Highway Supervisors, should be made by city draughtsmen, and thus yield a constant and considerable revenue to the city.

This was approved by the Director of the Department, and in one month the Registrar was enabled to make report that "During the month of February, 1888, draughtsmen in the Registrar's office of the Bureau of Surveys were employed 148 hours in making copies of underground plans for the Bell Telephone Company, and in view of the recent re-organization of the Highway Board of Supervisors, and its purpose to earn money for the public treasury, I respectfully suggest that all orders for copies of plans and payment for the same be made to your Board of Highway Supervisors, or the draughtsmen of your Board.

"And in conformity with that suggestion I herewith hand you a check, drawn to your order as President of the Board of Highway Supervisors for $148, being the legal fee of $1.00 per hour consumed in the preparation of said plans, and also an application for more copies of plans of a similar character, made by the Bell Telephone Company of Philadelphia."

The following shows the work of the office for the years

	1888.	1887.
Number of certificates of registered owners issued...	10,375	11,175
Number of certificates of registered owners issued for use of City Solicitor	209	400
Money earned, registry certificates	$2,617 00	$2,803 25
Money earned, miscellaneous	$800 20	$661 90
Original lots platted	8,503	9,039
Transfers platted	19,564	19,974
Number of plans made for departments and bureaus.	52	
Number of deeds registered	18,717	21,044
Number of registry books examined by public	18,203	
Examination and correction of titles and cancellation of errors in deeds handed in to be registered....	1,665	1,512
Certificates, legal opening of streets	2,739	879
Municipal liens examined and names of registered owners furnished Law Department	412	526
Number of worn out plans renewed and not heretofore reported	3	

Previous to last year, no record was kept of the number of registry plans books examined, nor of plans made for departments and bureaus.

The vastly increased work of the Bureau, as shown by the statistics, has been performed without increase in the force of the office, and has been accomplished through the systematic and unremitting attention of the men employed.

This is highly gratifying, but has been so general on the part of all in the office that I am impelled to refrain from specific commendations, the list at beginning of report showing the names of all officers and employees.

Respectfully submitted,

SAM. L. SMEDLEY,

Chief, Bureau of Surveys.

General Statement of Work of District Surveyors and Regulators for the year 1888.

Surveyor and Regulator.	District.	Lots surveyed.	Linear feet curb stakes.	Linear feet grade stakes.	Square yards of new paving measured, including footways and macadam.	Square yards of repairing measured, ditto.	Acres of street lines and grades projected.	Acres of revision of street lines and grades.	Acres of topography.	Acres of farm lands surveyed.	Approximate estimates.	Cubic yards grading measured.	Linear feet crossing stones measured.	Jury and railway plans.	Linear feet iron and stone cross-gutters.	Linear feet water-pipe measured.	Linear feet sewers measured.
Thomas Daly	1	996	49,500	5,000	36,192	53,730					20	4,557	2,568	3	2,998	5,741	16,009
C. W. Close	2	317	3,500	4,100	9,126	25,076											
W. C. Cranmer	3	180	30,000	15,000	30,933	65,574					10		7,059	7		1,194	8,363
E. D. Roberts	4	317	4,429		15,424	69,540											
And. French	5	45	4,567	10,320	10,075	43,965							3,150				
Joseph Mercer	6	577	3,091	2,148	121,058	121,058		533	533						137		
William Albertson	7	402	5,280	10,824	22,509												
C. A. Sundstrom	8	287	25,200	54,570	54,900	3,651		483	19	53	28	11,680	4,640	8	142	13,353	6,050
Walker Jones	9	414	39,280	81,292	54,696	2,159		482	372		55		3,954				
George S. Webster	10	1,224	20,400	86,500	69,515	69,515	315	1,371	1,710	626	64						
Joseph Johnson	11	920	26,484	26,919	68,086	68,086		70		193	43						
W. H. Jones	12	396	8,100	6,200	18,500	21,830	125	400	385	128	27		1,503	3			8,733
H. M. Fuller	13	1,928	71,426	26,944	82,203	41,595					141	25,270	8,788	1	28	5,437	27,079
Summary		8,003															

Statement of Receipts, Earnings, and Expenses in the First, Eighth, Eleventh, and Thirteenth Survey Districts.

	First District.				Eighth District.			
	Cash.	Fees.	Total.	Expenses.	Cash.	Fees.	Total.	Expenses.
1888.								
January	$133 00		$133 00	$453 71				
February	388 81	$119 00	507 81	475 36				
March	401 50		401 50	460 52				
April	618 88	51 50	670 38	448 16				
May	1,083 77	115 23	1,199 00	458 66				
June	1,298 26	5 00	1,303 26	459 28				
July	1,504 86	30 00	1,534 86	588 66				
August	874 77	58 38	933 15	462 76				
September	761 58	15 84	777 42	474 33	$409 67	$149 04	$558 71	$481 06
October	403 92		403 92	459 41	497 36	105 57	602 93	493 96
November	317 20	148 88	466 08	453 66	395 45	140 82	536 27	601 46
December	952 82		952 82	616 68	159 60	38 43	198 03	319 46
	$8,789 32	$543 83	$9,283 15	$5,761 19	$1,462 08	$433 86	$1,895 94	$1,895 94

Statement of Receipts, Earnings, and Expenses, etc.—Continued.

	Eleventh District.				Thirteenth District.			
	Cash.	Fees.	Total.	Expenses.	Cash.	Fees.	Total.	Expenses.
1888								
January								
February					$749 90		$749 90	$467 64
March					980 24		980 24	528 11
April	$701 23	$79 16	$780 49	$512 68	1,538 01	76 20	1,614 21	788 28
May	679 18	260 79	939 97	595 10	1,623 70	32 14	1,655 84	815 33
June	593 31	177 51	770 82	502 14	1,615 81	685 27	2,301 08	912 61
July	716 40	137 17	853 57	516 50	1,215 88	56 00	1,271 88	883 71
August	788 24	99 72	887 96	584 92	1,663 97	236 03	1,900 00	880 82
September	792 98	98 74	891 72	498 97	1,074 28	131 06	1,205 29	754 50
October	473 30	165 74	639 04	546 70	964 31	55 00	1,019 31	1,315 41
November	498 94	135 52	544 46	525 55	499 27	25 00	524 29	748 16
December	555 87	167 02	722 89	830 94	514 54	404 40	918 94	779 59
	$5,709 55	$1,321 37	$7,030 92	$4,973 50	$12,439 88	$1,701 10	$14,140 98	$8,874 11

The permits issued in each month were as follows:

January	25	July	347
February	8	August	288
March	155	September	281
April	336	October	270
May	365	November	290
June	357	December	36

The number in each ward:

First	48	Eighteenth	23
Second	38	Nineteenth	189
Third	25	Twentieth	169
Fourth	27	Twenty-first	84
Fifth	41	Twenty-second	145
Sixth	66	Twenty-third	25
Seventh	61	Twenty-fourth	284
Eighth	81	Twenty-fifth	96
Ninth	60	Twenty-sixth	100
Tenth	82	Tweny-seventh	53
Eleventh	21	Twenty-eighth	324
Twelfth	39	Twenty-ninth	218
Thirteenth	56	Thirtieth	20
Fourteenth	76	Thirty-first	43
Fifteenth	171	Thirty-second	9
Sixteenth	47	Thirty-third	5
Seventeenth	32		

The character of the drainage was:

Water closets	3,670	Slaughter-houses	16
Surface	1,015	Ice-houses	5
Sinks	422	Markets	4
Cellars	310	Breweries	7
Stables	32	For future use	220
Factories	28	Miscellaneous	25

The receipts of the bureau from all sources during the year were as follows:

January	$434 82	July	$2,690 08
February	950 79	August	2,472 90
March	2,167 96	September	2,384 88
April	2,633 33	October	1,213 52
May	3,316 82	November	2,788 58
June	3,116 00	December	1,066 76

RECAPITULATION.

For sewer permits	$17,058 00
For searches in Registry Bureau	2,617 00
For sewer bills and balances	5,384 24
For copies of plans, certificates, etc., etc.	1,177 21
Total	$26,236 45

Total Length of Sewers built during the year 1888.

Description.	Feet.	Miles.
Main sewers	11,663.28	2.190
Intercepting sewer and connections	2,142.00	407
Branch sewers	149,765.83	28.365
Branch sewers (at private cost)	10,124.00	1.917
Total	173,600.11	32.879

Main Sewer Statement for the Year 1888.

Location.	Diameter in feet.	Length in feet.	Price per foot.	Payments. In assessment bills.	Payments. In warrants.	Total cost.	Inspectors.	Contractors.
Aramingo street, south of Ann street, Twenty-fifth Ward	6' x 12' 4"	465	$9 97	$1,194 98	$3,541 07	$4,736 05	H. M. Smith	D. A. Kennedy.
Aramingo street, between Ontario and Tioga streets	1' 3" x 2'	847			2,040 00	2,040 00	C. P. McCally	George S. Corson.
Bridge street, between Melrose street and Frankford creek, Twenty-third Ward	4' 6"	798.33	12 00		8,500 00	8,500 00	H. M. Smith	W. H. H. Achuff.
Bridge street, between Melrose and Trenton avenue, Twenty-third Ward	4' 6" 4	525.17 688	10 50 9 50	2,189 20	9,861 05	12,050 25	C. R. Vanhorn	W. H. H. Achuff.
Balnbridge street, between Schuylkill avenue and Schuylkill river, East Side Railroad	3' 6"	453	10 65		4,821 45	4,824 45	F. J. Watt	H. C. Eyre.
Clearfield street, between Ninth street and Connecting Railroad	8' 6" 8' 3"	66 658	17 75		6,624 00		C. R. Vanhorn	W. H. H. Achuff.
Clearfield street, from Fifteenth to Seventeenth streets	7	674	20 00		10,584 60		John Able, Jr.	R. A. Malone & Co.
Centre and Engle streets, Twenty-second Ward	4 3	256 106	13 75 12 75		4,871 50	4,871 50	S. H. Colborn	C. J. Kennedy.
Fifty-second street, between Monroe street and Lancaster ave., Twenty-fourth Ward	7¼	1,541.00	$16 70		$17,664 00		H. M. Smith	H. F. Sullivan.
Jasper and Clearfield streets, between Allegheny and Kensington avenues, Twenty-fifth Ward	4' 9" 4	798.38 470.52	8 35 8 35	$2,759 52	7,844 79	$10,595 31	H. M. Smith	H. F. Sullivan.

Main Sewer Statement for the Year 1888.

Location.	Diameter in feet.	Length in feet.	Price per foot.	Payments.		Total cost.	Inspectors.	Contractors.
				In assessment bills.	In warrants.			
Lombard street, from Eighth street westward..	4′ 6″ x 6′ 0″	571.00	18 00	.....	8,222 40	.....	E. H. Seckel.....	James Deehan.
Meadow street, between Chestnut and Market streets (Mill creek), Twenty-fourth Ward.....	20 x 20	290.00	59 75	882 00	18,852 18	24,437 75	H. M. Smith.....	Peter P. Deehan.
Powelton avenue, between Twenty-fourth street and Schuylkill river.....	8	527.00	75 00 50 00	.....	19,312 00	.....	Saluthiel Cox.....	R.A. Malone & Co.
Reed street, between Schuylkill river and the Baltimore and Ohio Railroad.....	4′ 6″ 4′ 0 x 4′ 6″	694.05 21.00	18 00	.....	9,587 70	9,587 70	F. J. Watt.....	T. P. Smart
Snyder avenue, between Commercial avenue and Delaware river.....	8	459.00	43 00	.....	6,461 00	.....	Abm. Ruth.....	John S. Dutton.
Westmoreland and Jasper streets, One (1) Chamber, $1,680, Twenty-fifth Ward.....	8′ 6″ 7′ 0″ 4′ 9″ 3′ 0″	582.74 194.40 903.57 63.67	16 80 15 80 8 80 7 80	3,777 60	18,643 18	22,420 78	H. M. Smith.....	W. H. H. Achuff.
Total.....	.....	11,563 28	.....	$10,794 80	$157,433 27			

Intercepting Sewer and Connections—Statement for the year 1888.

Location.	Diameter in feet and inches.	Length in feet.	Price per foot.	Payments.		Total cost.	Inspectors.	Contractors.
				In assessment bills.	In warrants.			
Section 13, along the Schuylkill canal from Leverington northward, one (1) flushing chamber, $2,800	2′ 10″x3′ 7″	465	$13 00	.....	$17,366 52	$32,479 00	C. Y. Lauderbach.	James Sullivan.
Wissahickon Valley sewer, section 2, from Maple Spring Hotel to near Rittenhouse lane	2′ 4″ x 3′ 6″	795	9 00	.....	15,523 20	23,109 00	C. R. Van Horn...	W. H. H. Achuff.
Wissahickon Valley sewer, section 3, near Rittenhouse lane	2′ 4″ x 3′ 6″	140	9 00	.....	.....		F. J. Watt.....	H. C. Eyre.
Main street between Cedar and Levering streets, Twenty-first Ward	20″ Pipe	26	.....	.....	2,457 60		C. Y. Lauderbach	D. A. Kennedy.
	12″ Pipe	287	5 15					
	10″ Pipe	275	2 95					
	8″ Pipe	250	.....					
Total	.....	2,147	.....	.....	$35,347 32	.....		

Detailed Statement of Branch Sewers Built by the City during the year 1888.

Branch Sewers		Brick and Stone Inlets.				Manholes.			Wellholes.			Payments.		Inspection.	Deductions.	Total Expenditures.
Feet.	Miles.	Size.	No. built.	Cost each.	Total cost.	No. built.	Cost each.	Total cost.	No. of feet.	Cost per foot.	Total cost.	In Assessment bills.	In City Warrants.	Cost of Inspection.	Deductions on account of delays, paving, etc.	
		1	3	$96	$288 00	.....	.....	.....								
149,765.83	28.37	2	141	87	12,267 00	961	$25	$24,025 00	384.82	$5	$1,924 10	$329,561 93	$148,767 40	$20,224 62	$788 34	$498,553 95
		3	302	81	24,462 00	54	40	2,160 00								

Detailed Statement of Branch Sewers built by the City during the year 1888—Continued.

Size of Sewers.	Length in Feet.
Egg-shaped, 4′ 6″ x 3′	452.00
Egg-shaped, 4′ 6″ x 2′ 8″	1,403.41
Egg-shaped, 4′ 3″ x 2′ 10″	392.99
Egg-shaped, 4′ 0″ x 2′ 8″	2,339.45
Egg-shaped, 3′ 6″ x 2′ 4″	7,660.50
Egg-shaped, 3′ 3″ x 2′ 2″	3,547 49
Egg-shaped, 3′ x 2′	66,857.54
Egg-shaped, 2′ 6″ x 1′ 8″	17,834.41
Egg-shaped, 2′ 3″ x 1′ 6″	45,835.18
Circular, 3′ 3″	91.00
Circular, 3′	905.00
Circular, 2′ 9″	419.82
Cicular, 2′ 6″	2,476.59
Circular, 2′	2,044.31
Circular, 15-inch pipe	2,245.01
Circular, 12-inch pipe	6,634.75
Circular, 8-inch pipe	5,589.96
Total	165,713.83
Deduct as accounted for in 1887 report	15,953.00
Total built during the year 1888	149,765.83

Sewers Built at Private Expense.

Shape.	Size.	Length.
Egg-shaped	2′ x 3′	1,049
Egg-shaped	1′ 8″ x 2′ 6″	816
Egg-shaped	1′ 6″ x 2′ 3″	2,093
Circular	15″	1,105
Circular	12″	4,704
Circular	10″	38
Circular	8″	320
Total length in feet		10,124

Length and Cost of Sewers built during the year 1888.

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Aspen st., from Forty-seventh to Forty-third sts.	3 ft. 0 in. x 2 ft. 0 in.	800									$2 29							
	2 ft. 6 in. x 1 ft. 8 in.	425									2 49							
	2 ft. 3 in. x 1 ft. 6 in.	389.5									2 32							1888.
	12-inch pipe	18	2	8	$87 00	8	$25 00				1 10	$2918 50	$1783 40	$4701 90		Jos. Hunter	H. P. McTague	May 4
Anglo st., from Germantown ave. to Old York road	2 ft. 6 in. x 1 ft. 8 in.	471.75	2	1	87 00	3	25 00				2 20	916 62	283 23	1199 85		Con. F. Brown	Geo. W. Ruch	Aug. 8
Almond st., from Dauphin to Norris sts.	3 ft. 0 in. x 2 ft. 0 in.	242									2 15							
	12-inch pipe	3	2	2	87 00	3	25 00				1 10	461 88	310 72	772 60		Aug. Durr	W. H. Yost	Dec. 20
Brown st., from Thirty-seventh to Thirty-eighth sts.	2 ft. 6 in. x 1 ft. 8 in.	395.5									2 35							
	12-inch pipe	9	2	5	87 00	2	25 00				1 10	720 00	730 72	1450 72		C. R. Van Horn	J. McParland	April 3
Broad st. (west side), from Reed to Morris sts.	3 ft. 0 in. x 2 ft. 0 in.	1304.5				9	25 00				1 94	1683 33	1067 35	2755 73		Jas. McGill	Edw. McCann	April 19
Buttonwood st., from Tenth to Eleventh sts.	3 ft. 0 in. x 2 ft. 0 in.	458				3	25 00				2 27	1114 66		1114 66	47 99	Aug. Durr	Jos. Johnson	April 23
Baring st., from Thirty-first st. to 100 ft. east of Thirty-second st.	2 ft. 3 in. x 1 ft. 6 in.	177.5				3	25 00				2 40	353 00	123 00	476 00		Jas. Duffy	W. H. H. Achuff	April 25
Burns st., from Brown to Parrish sts.	3 ft. 0 in. x 2 ft. 0 in.	404				3	25 00				2 13	935 52		935 52	12 48	Thos. D. Hooper	B. F. Shelmire	May 28
Beach st., from Fairmount ave. to Brown st.	2 ft. 3 in. x 1 ft. 6 in.	358				3	25 00				2 27	811 53	76 13	887 66		W. J. Little	H. S. Hong	June 23
Brown st., from Twenty-fifth to Twenty-sixth sts.	3 ft. 0 in. x 2 ft. 0 in.	448				3	25 00				2 27	999 44	92 52	1091 96		Thos. D. Hooper	H. S. Hong	July 30
Bucknell st., from Brown to Parrish sts.	3 ft. 0 in. x 2 ft. 0 in.	403	3	1	81 00	3	25 00				2 27	931 00	139 81	1070 81		John Vicary	W. H. Yost	Aug. 3
Buttonwood st., from York ave. to Fourth st.	2 ft. 3 in. x 1 ft. 6 in.	334																
	12-inch pipe	30	3	1	81 00	2	25 00				2 17	788 47	100 31	888 78		Jas. McGill	W. B. M. Conklin	Aug. 9

Length and Cost of Sewers Built during the year 1888—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payments.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Bringhurst st., from Germantown ave. to Mercer st., and on Mercer st., from Bringhurst to Ashmead sts.	3 ft. 0 in. x 2 ft. 0 in. 12-inch pipe	2151 36	2	3	$87 00	5	$25 00	22	5	110 00	$2 43 1 10	$5730 52	.....	$5730 52	$116 01	S. H. Collom	Deitz & Murray	Aug. 21
Broad st. (east side), from Dauphin st. to Susquehanna av.	2 ft. 3 in. x 1 ft. 6 in.	586.5	.....	.....	.....	3	25 00	.....	.....	.....	2 25	720 00	$674 62	1394 62	.....	S. R. Franklin	James Doehan	Aug. 23
Bainbridge, st., from Tenth to Eleventh sts.	3 ft. 0 in. x 2 ft. 0 in.	410	3	2	81 00	3	25 00	.....	.....	.....	2 06	785 31	304 49	1089 80	.....	Geo. Moore	Edw. McCann	Aug. 25
Boynton st., from Wister to Wisteria ave.	2 ft. 3 in. x 1 ft. 6 in.	808.5	3	2	81 00	4	25 00	.....	.....	.....	2 63	2220 20	168 15	2388 35	.....	John Able, Jr.	John Kerrigan	Aug. 30
Baltimore ave, from Forty-third to Forty-fifth sts.	3 ft. 6 in. x 2 ft. 4 in.	1056	2	4	87 00	5	25 00	.....	.....	.....	3 19	1826 77	2014 87	3841 64	.....	W. P. Brown	John McParland	Sept. 14
Bainbridge st., from Front to Third sts.	2 ft. 6 in. x 1 ft. 8 in. 12-inch pipe	981 31	3	5	81 00	6	25 00	.....	.....	.....	2 18 1 10	2246 87	428 13	2675 00	.....	Jno. McCormick	Peter P. Doehan	Sept. 21
Baker st., from sewer in Germantown av. to easterly side of Nice street.	2 ft. 6 in. x 1 ft. 8 in.	262.5	3	1	81 00	3	25 00	.....	.....	.....	2 19	591 48	114 39	705 87	.....	Abm. Ruth	W. H. Yoast	Oct. 18
Broad st. (east side), from Federal to Ellsworth sts.	2 ft. 6 in. x 1 ft. 8 in.	360.5	.....	.....	.....	3	25 00	.....	.....	.....	1 90	397 04	362 91	759 95	.....	T. A. Brackney	Edw. McCann	Oct. 23
Brandywine st., from Twenty-first to Twenty-second sts.	3 ft. 0 in. x 2 ft. 0 in. 12-inch pipe	434 12	.....	.....	.....	3	25 00	.....	.....	.....	3 79 1 10	1036 16	696 90	1733 06	.....	C. F. Brown	W. P. Clement	Oct. 30
Baring st., from Sloan to State sts.	2 ft. 3 in. x 1 ft. 6 in. 12-inch pipe	178 27	.....	.....	.....	1	25 00	.....	.....	.....	1 99 1 11	353 65	55 27	408 92	.....	Wm. Yetter	John McParland	Dec. 6
Belgrade st., from Montgomery ave. to Vienna sts.	3 ft. 0 in. x 2 ft. 0 in. 12-inch pipe	378 3	2	1	87 00	3	25 00	.....	.....	.....	2 13 1 10	683 58	286 86	970 44	.....	F. G. Ballentine	W. B. M. Conklin	Dec. 8
Chelton ave., between Hancock st. and Bellfield ave., and Chelton ave., between Bellfield and Wilson avs.	4 ft. 0 in. x 2 ft. 0 in. 2 ft. 3 in. x 1 ft. 6 in.	467.5 809	2	2	87 00	6	25 00	.....	.....	.....	4 97 2 09	3320 88	1017 40	4338 28	.....	D. J. Davis	H. P. McTague	April 7

Length and Cost of Sewers Built during the year 1888—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wellholes.			Cost per foot.	Payments.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Cumberland st., from Broad to Fifteenth sts	3 ft. 0 in. x 2 ft. 0 in.	230.84	3	1	$81 00	2	$25 00	.....	.....	.....	$2 33	$533 48	$135 36	$668 84	.....	D. J. Davis	H. C. Hong	April 19
Cumberland st., from Emerald to Jasper sts	3 ft. 0 in. x 2 ft. 0 in.	434	.....	.....	.....	3	25 00	.....	.....	.....	2 33	1086 22	.....	1086 22	3 65	John Vicary	W. B. M. Conklin	May 12
Catharine st., from Eleventh st. to Broad st	3 ft. 0 in. x 2 ft. 0 in.	1402	3	8	81 00	29	25 00	.....	.....	.....	2 05	3023 84	723 86	3747 10	.....	W. J. Little	Edw. McCann	May 21
Carlisle st., from Dauphin to York st	2 ft. 3 in. x 1 ft. 6 in.	547	.....	.....	.....	3	25 00	.....	.....	.....	2 25	1305 75	.....	1305 75	88 25	Jos. Hunter	P. C. & T. McEntee	June 8
Castle ave., from Broad to Sixteenth st	2 ft. 3 in. x 1 ft. 6 in.	448	3	2	81 00	3	25 00	.....	.....	.....	1 92	952 00	145 16	1097 16	.....	S. Cox	Henry Smart	June 12
Cass st., from the sewer in Twelfth st. to e. c. l. of Thirteenth st., with pipe connection to Thirt'nth st,	2 ft. 3 in. x 1 ft. 6 in. 12-inch pipe	443 18	.....	.....	.....	3	25 00	.....	.....	.....	2 25 1 10	1055 50	36 05	1091 55	.....	C. R. Van Horn	P. C. & T. McEntee	June 14
Currant alley, from Spruce to Locust sts	2 ft. 3 in. x 1 ft. 6 in.	443	3	1	81 00	3	25 00	.....	.....	.....	2 33	969 51	188 68	1158 19	.....	W. J. Little	John M. Donnelly	June 21
Clearfield st., at Laurence st. to c. c. l. of Fourth st., thence in Fourth to Clearfield, to Indiana ave.	3 ft. 0 in. x 2 ft. 0 in. 15-inch pipe	266.5 548.83	2 3	1 2	87 00 81 00	.....	.....	.....	.....	.....	2 19 1 79	1695 69	294 35	1990 04	.....	W. P. Brown	John McParland	July 7
Charlotte st., from Canal to George st	2 ft. 3 in. x 1 ft. 6 in.	480	3	2	81 00	3	25 00	.....	.....	.....	2 17	1248 88	29 72	1278 60	.....	John Vicary	W. H. Yoast	July 11
Callowhill st., from Eighth st. to Ridge avenue	3 ft. 0 in. x 2 ft. 0 in. 12-inch pipe	811 26	.....	.....	.....	8	25 00	.....	.....	.....	2 61 1 10	1974 99	397 32	2346 31	.....	T. A. Brackney	B. F. Shelmire	July 14
Cherry st., between Claremont st. and west side of Twenty-first st	12-inch pipe	182	3	1	81 00	1	25 00	.....	.....	.....	1 70	337 50	77 90	415 40	.....	E. H. Sickler	H. S. Hong	July 31
Crawford st., from the sewer in Ridge avenue northward to the creek	3 ft. 8 in. cir. Rubble masonry	91 5 c. yds.	.....	.....	.....	1	40 00	.....	.....	.....	9 00 4 50	.....	881 50	881 50	.....	C. Y. Lauderbach	B. J. Sullivan	Aug. 6

Length and Cost of Sewers Built during the year 1888—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wellholes.			Cost per foot.	Payments.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Cherry st., from present terminus, to Twentieth st.	12-inch pipe	40	3	1	$81 00	.....	$40 00	.....	.....	.....	$1 95	$100 00	$59 11	$159 00	.....	E. H. Sickler	H. Smart	Aug. 20
Catharine st., from Sixteenth to Seventeenth sts.	3 ft. 0 in. x 2 ft. 0 in.	426	.....	.....	.....	.....	.....	.....	.....	.....	1 93							
	12-inch pipe	18	.....	.....	.....	3	25 00	.....	.....	.....	1 10	916 98	.....	916 98	$79 49	E. H. Sickler	Ed. McCann	Aug. 25
Cambridge st., from Nineteenth to Twentieth sts.	2 ft. 3 in. x 1 ft. 6 in.	426	.....	.....	.....	.....	.....	.....	.....	.....	1 98							
	12-inch pipe	27	.....	.....	.....	3	25 00	.....	.....	.....	1 10	948 18	.....	948 18	85 17	Wm. Yetter	Geo. W. Hansell	Sept. 12
Callowhill st., from Fifth st. to 70 feet east of Fifth st.	2 ft. 3 in. x 1 ft. 6 in.	100	.....	.....	.....	1	25 00	.....	.....	.....	2 00	182 37	165 63	248 00	.....	W. J. Little	J. G. Conklin	Sept. 25
Cumberland st., from Philip to American sts.	3 ft. 0 in. x 2 ft. 0 in.	164	.....	.....	.....	.....	.....	.....	.....	.....	2 34							
	12-in. pipe	3	2	2	87 00	2	25 00	.....	.....	.....	1 10	365 28	245 80	611 08	.....	S. R. Franklin	J. P. Shelmire	Nov. 10
Cumberland st., from Second to Philip sts., and on Philip northward	3 ft. 0 in. x 2 ft. 0 in.	486	.....	.....	.....	3	25 00	.....	.....	.....	2 27	1,092 00	86 22	1,178 22	.....	S. R. Franklin	C. Smith	Nov. '12
Coral st., from Ella to York sts.	3 ft. 0 in. x 2 ft. 0 in.	210	2	2	87 00	2	25 00	.....	.....	.....	2 28	388 50	303 80	692 30	.....	Geo. Moore	J. G. Conklin	Dec. 6
Catharine st., from Eighth to Eleventh sts.	3 ft. 0 in. x 2 ft. 0 in.	1321	.....	.....	.....	.....	.....	.....	.....	.....	2 05							
	12-in. pipe	6	3	9	81 00	9	25 00	.....	.....	.....	1 10	2,078 60	1,590 05	3,668 65	.....	T. A. Brackney	Ed. McCann	Dec. 11
Cherry st., from Sixth to Seventh sts.	12-in. pipe	492	.....	.....	.....	2	25 00	.....	.....	.....	1 97	988 88	35 36	1,019 24	.....	T. D. Hooper	Geo. W. Buck	Dec. 11
Cumberland st., from Coral st. to sewer in Amber st.	3 ft. 0 in. x 2 ft. 0 in.	379	3	1	81 00	3	25 00	.....	.....	.....	2 15	970 85	.....	970 85	76 05	Geo. Moore	H. H. Dambly	Dec. 13
De Kalb st., from Brown to Aspen sts.	2 ft. 3 in. x 1 ft. 6 in.	397	.....	.....	.....	.....	.....	.....	.....	.....	2 35							
	12-in. pipe	33	2	2	87 00	3	25 00	.....	.....	.....	1 10	930 00	261 85	1,191 85	.....	C. R. Van Horn	J. P. McFarland	April 3
Dickinson st., from Cedar to Gaul sts.	3 ft. 0 in. x 2 ft. 0 in.	416	2	2	87 00	3	25 00	.....	.....	.....	2 18	1,008 63	147 25	1,155 88	.....	John Vicary	W. H. Yoast	May 22
Duponceau st., from Walnut to Locust sts.	2 ft. 3 in. x 1 ft. 6 in.	394.67	.....	.....	.....	3	25 00	.....	.....	.....	3 17	925 69	400 40	1,326 09	.....	W. J. Little	H. S. Hong	June 27
Dohan st., from Forty-eighth to Forty-ninth sts.	2 ft. 6 in. x 1 ft. 8 in.	512.5	.....	.....	.....	3	25 00	.....	.....	.....	4 35	1,171 05	1,133 32	2,304 37	.....	N. B. Beam	John Noonan	July 24

Length and Cost of Sewers Built during the year 1888—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payments. In assessment bills.	Payments. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Dickinson st., from Ninth st. west 185 ft.	3 ft. 0 in. x 2 ft. 0 in.	222.17				2	25 00				$2 37	$433 44	$143 09	$576 53		Wm. May	D. M. Smart	Nov. 9
Diamond st., from Twenty-ninth to Thirtieth sts.	2 ft. 3 in. x 1 ft. 6 in.	282 00				2	25 00				1 87	318 00	225 00	543 00		Jos. Hunter	Fred. Starke	Dec. 15
Eighth st., from Christian to Carpenter sts.	2 ft. 6 in. x 1 ft. 8 in.	478									2 21							
	12-inch pipe	50	3	4	81 00	3	25 00	8½	5	42 50	1 10	1071 63	481 25	1552 88		John Vicary	W. B. M. Conklin	May 2
Eleventh st., from Nevada to Dauphin sts.	2 ft. 3 in. x 1 ft. 6 in.	214.5									2 93							
	12-inch pipe	16				1	25 00				1 10	200 66	470 42	671 08		F. G. Ballentine	Geo. W. Ruch	June 8
Eighteenth st., from Seybert to Cabot sts.	2 ft. 3 in. x 1 ft. 6 in.	210									1 99							
	12-inch pipe	3				1	25 00				1 10	381 13	46 17	427 30		Aug. Durr	Burns & Higgins	Aug. 28
Eighteenth st., from Tioga to Venango sts.	2 ft. 3 in. x 1 ft. 6 in.	547.5				3	25 00				2 19	1125 00	149 02	1274 02		John G. Moore	John McParland	Sept. 26
Ellsworth st., from Tenth to Eleventh sts.	3 ft. 0 in. x 2 ft. 0 in.	429.25	3	4	81 00	3	25 00				1 97	894 52	350 10	1 44 52		T. A. Brackney	Burns & Higgins	Oct. 18
Eleventh st., from Snyder ave. to Emily st.	3 ft. 0 in. x 2 ft. 0 in.	294.25	3	3	81 00	2	25 00				2 40	523 74	475 46	999 20		T. A. Brackney	James Deehan	Dec. 11
Eighteenth st., from Tioga to Ontario sts.	2 ft. 3 in. x 1 ft. 6 in.	544									1 99							
	12-inch pipe	12	3	1	81 00	4	25 00				1 10	1276 76		1276 76	95 24	John G. Moore	Robert Higgins	Dec. 13
Forty-fourth st., from Walnut to Spruce sts., and on	3 ft. 9 in. x 2 ft. 0 in.	350									2 19					Wm. Wilson and		
Locust st., from Forty-third to Forty-fourth sts.	2 ft. 6 in. x 1 ft. 8 in.	836	3	4	81 00	6	25 00				3 49	2594 95	1563 19	4158 14		C. R. Van Horn	John McParland	Jan. 21
Forty-seventh st., from Woodland to Kingsessing aves.	3 ft. 0 in. x 2 ft. 0 in.	723	3	3	81 00	4	25 00				3 60	1747 43	1198 37	2945 80		John G. Moore	T. P. Smart	May 5

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Fletcher st., from the sewer in Twenty-seventh st. to the middle of Twenty-sixth st.	2 ft. 3 in. x 1 ft. 6 in.	453.25				3	$25 00				$1 90	$936 17		$936 17	$61 50	Wm. Yetter	P. C. & G. McEntee	1888. May 10
Fifth st., from Dauphin to York sts.	2 ft. 3 in. x 1 ft. 6 in.	568.83				3	25 00				2 24	1349 18		1349 18	112 82	Jos. Hunter	P. C. & G. McEntee	May 19
Fifteenth st., from Summer to Spring sts.	12-inch pipe	180.5									1 86							
	12-inch pipe	5				2	25 00				1 10	283 01		283 01		S. Cox	H. Smart	May 21
Forty-first st., from Market st. to a point 150 feet south of Market st.	2 ft. 6 in. x 1 ft. 8 in.	185				2	25 00				2 22	256 50	$204 20	460 70		N. B. Beam	J. H. Hathaway	May 24
Front st., from Lombard to South sts.	2 ft. 3 in. x 1 ft. 6 in.	340				2	25 00	5	5	25 00	2 45	874 21	33 79	908 00		C. R. Van Horn	W. P. Clement	May 31
Fifth st., from Christian to German sts.	3 ft. 0 in. x 2 ft. 0 in.	820	3	6	81 00	4	25 00				2 49	1745 19	882 61	2627 80		John McCorm'k	James Deehan	May 31
Front st., from Pine to Lombard sts.	3 ft. 0 in. x 2 ft. 0 in.	372	3	2	81 00	2	25 00				2 45	819 69	303 71	1123 40		C. R. Van Horn	W. P. Clement	May 31
Fifteenth st., from Indiana ave. to Clearfield st.	3 ft. 0 in. x 2 ft. 0 in.	592	3	1	81 00	3	25 00				2 37	1209 33	200 00	1409 73		H. M. Smith	H. S. Hong	June 8
Fifteenth st., from Reed to Tasker st.	3 ft. 0 in. x 2 ft. 0 in.	872.5									1 94							
	12-inch pipe	21	3	3	81 00	6	25 00				1 10	2108 75		2108 75	6 42	S. Cox	Ed. McCann	June 23
Forty-first st., from Fairmount ave. to Green st.	2 ft. 3 in. x 1 ft. 6 in.	318	3	1	81 00	2	25 00				2 13	800 13	8 21	808 34		Jas. McGill	W. B. M. Conklin	June 30
Federal st., from Fifteenth to Seventeenth sts.	3 ft. 0 in. x 2 ft. 0 in.	912	3	6	81 00	6	25 00				2 08	2071 72	461 23	2532 96		George Moore	Ed. McCann	July 10
Forty-sixth st., from Aspen to Brown sts.	2 ft. 3 in. x 1 ft. 6 in.	394.5									2 09							
	12-inch pipe	18				3	25 00				1 10	919 30		919 30	100 70	N. B. Beam	John Noonan	Aug. 23

Length and Cost of Sewers Built during the year 1888—(Continued.)

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Fletcher st., from Twenty-ninth to Thirtieth sts.	2 ft. 3 in. x 1 ft. 6 in.	479				2	$25 00				$1 95	$974 30		$974 30	31 34	Wm. Yetter	Geo. W. Hansell	Aug. 27
Fitzwater st., from Broad to Sixteenth sts.	2 ft. 6 in. x 1 ft. 8 in.	491									1 96							
	12-inch pipe	472	3	7	$81 00	6	25 00				1 62	1842 92	$550 08	2393 00		S. Cox	H. Smart	Sept. 10
Fifth st., from Snyder ave. to Jackson st.	3 ft. 0 in. x 2 ft. 0 in.	468.75	3	5	81 00	2	25 00				2 35	751 05	800 00	1551 09		S. Franklin	James Deehan	Sept. 12
Forty-first st., from Spring Garden st. south.	2 ft. 3 in. x 1 ft. 6 in.	228									1 99							
	12-inch pipe	9				2	25 00				1 10	497 40		497 40		N. B. Beam	Burns & Higgins	Sept. 17
Fifth st., from Noble to Buttonwood sts.	2 ft. 3 in. x 1 ft. 6 in.	365									2 08							
	12-inch pipe	40	3	1	81 00	3	25 00				1 10	927 76	31 44	959 20		T. D. Hooper	Geo. W. Ruch	Sept. 24
Fifth st., from German to Monroe sts.	3 ft. 0 in. x 2 ft. 0 in.	242.5				1	25 00				2 43	534 48	79 89	614 27		E. H. Sickles	Edw. McCann	Sept. 24
Fourth st., from Christian to Carpenter sts.	3 ft. 0 in. x 2 ft. 0 in.	484	3	2	81 00	2	25 00	17	5	$85 00	2 78	1176 54	465 98	1642 52		N. B. Beam	W. P. Clement	Oct. 1
Fairmount ave., from Thirty-ninth to Union sts.	2 ft. 3 in. x 1 ft. 6 in.	411				3	25 00				1 87	843 75		843 75	146 43	N. B. Beam	Burns & Higgins	Oct. 2
Front st., from Harrison st. to Montgomery ave.	3 ft. 0 in. x 2 ft. 0 in.	349	3	1	81 00	3	25 00				2 31	882 78	79 41	962 19		W. J. Little	J. G. Conklin	Oct. 2
Fourth st., from Lombard to Pine sts.	3 ft. 0 in. x 2 ft. 0 in.	349	3	1	81 00	2	25 00				2 37	299 56	658 57	958 13		Jas. McGill	W. B. M. Conklin	Oct. 5
Forty-sixth st., from Woodland to Springfield avs.	2 ft. 6 in. x 1 ft. 8 in.	1672									3 47							
	12-inch pipe	12	3	3	81 00	8	25 00				1 10	3850 07	2407 97	6258 04		W. P. Brown	H. S. Hong	Oct. 30
Fifteenth st., from Venango st. to Erie ave.	3 ft. 0 in. x 2 ft. 0 in.	556				3	25 00				2 09	1237 04		1237 01	46	John Vicary	Burns & Higgins	Nov. 7
Fawn st., from Columbia to Montgomery avs.	2 ft. 3 in. x 1 ft. 6 in.	468				3	25 00				2 19	1099 92		1099 92	9 08	T. D. Hooper	B. F. Shelmire	Nov. 12
Federal st., from Seventh to Twelfth sts.	3 ft. 0 in. x 2 ft. 0 in.	2216.58									2 00							
	12-inch pipe	12	3	6	81 00	14	25 00				1 10	4390 43	891 93	5282 36		T. A. Brackney	Edw. McCann	Nov. 16

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Girard st. (south side), from Broad to Sixth sts.	3 ft. 0 in. x 2 ft. 0 in.	2730									$3 09	$1941 83	$6857 48	$8799 31		T. A. Brackney.	John Noonan	April 23
Garfield st., from Wakefield st. to Germantown ave.	3 ft. 0 in. x 2 ft. 0 in.	927.67				5	$25 00				2 60	2323 23	218 90	2542 13		John Able, Jr.	John Kerrigan	June 12
Germantown ave., from Mill to Coulter sts.	3 ft. 0 in. x 2 ft. 0 in.	512.5				4	25 00				4 85	1043 10	1517 42	2560 52		S. W. Collom	John Kerrigan	June 23
Green st., from Fourth to Fifth sts.	2 ft. 3 in. x 1 ft. 6 in.	497									1 93							
	12-inch pipe	3				3	25 00				1 10	1037 51		1037 51	$169 03	Jas. McGill	W. B. M. Conklin	July 10
Girard ave. s. s., from Sixth st. to Frankford ave.	3 ft. x 2 ft.	2453.58									2 72							
	12-inch pipe	69	3	1	$81 00	15	25 00				1 10	2442 74	4762 90	7205 64		C. R. Van Horn	P. C. & T. McEntee	Sept. 11
Gaul st., from Vienna st. to Montgomery ave.	3 ft. x 2 ft.	380.5	2	2	87 00	3	25 00				2 15	507 83	600 00	1107 33		John Vicary	W. H. Yoast	Oct. 8
George st., from Lawrence to Fifth sts.	2 ft. 3 in. x 1 ft. 6 in.	284									2 11							
	12-inch pipe	3				2	25 00				1 10	569 41	83 13	652 54		E. P. Hill	J. G. Conklin	Dec. 11
Gratz st., from the sewer in Susquehanna ave. to Diamond st.	2 ft. 3 in. x 1 ft. 6 in.	554	3	2	81 00	3	25 00				1 85	972 00	100 00	1072 00		S. R. Franklin	Fred. Starke	Dec. 15
Hamilton st., from Thirty-second to Thirty-third st.	12-inch pipe	210				2	25 00				2 15	479 50	22 00	501 50		E. H. Sickles	D. M. Smart	April 9
Holly street, from Ogden to Parrish sts.	2 ft. 3 in. x 1 ft. 6 in.	367.7									2 08							
	12-inch pipe	12				2	25 00				1 10	828 01		828 01	11 16	W. P. Brown	H. Smart	April 20
Haverford st., from Thirty-ninth to Union sts.	2 ft. 6 in. x 1 ft. 8 in.	407.5				3	25 00				2 00	890 00		890 00	211 00	N. B. Beam	John Noonan	June 23
Holly st., from Ogden st. to Westminster ave.	2 ft. 3 in. x 1 ft. 6 in.	364.3									1 85							
	12-inch pipe	15				3	25 00				1 10	765 45		765 45		N. B. Beam	John Noonan	July 11
Hewson st., from Girard ave. to Wildey st.	3 ft. x 2 ft.	349									2 27							
	12-inch pipe	14				4	25 00				1 10	907 63		907 63	15 63	John Vicary	Wm. H. Yoast	Aug. 29

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Harlan st., from Nineteenth to Twentieth sts.	2 ft. 3 in. x 1 ft. 6 in.	448				3	$25 00				$2 07	$1002 36		$1002 36	$116 14	W. P. Brown	John McParland	Aug. 7
Hanover st., from Girard ave. to Delaware river	3 ft. 6 in. x 2 ft. 4 in.	1561									2 27							
	12-inch pipe	40	3	10	$81 00	9	25 00				1 10	3601 74	$1020 73	4622 47		James McGill	W. B. M. Conklin	Sept. 7
Hurly st., from Hart lane to s. c. line of Indiana st	15-inch pipe	325.75	3	1	81 00	3	25 00				1 94	704 21	83 74	789 95		David J. Davis	Geo. W. Ruch	Oct. 18
Herman st., from the e. c. l. of Twenty-sixth st. to the sewer in Twenty-eighth st.	2 ft. 3 in. x 1 ft. 6 in.	852.5									1 98							
	12-inch pipe	11	3	4	81 00	6	25 00				1 10	1932 75	241 30	2174 05		Wm. Yetter	G. W. Hansell	Oct. 18
Hope st., from Girard ave. to Hancock st.	2 ft. 3 in. x 1 ft. 6 in.	429.75				3	25 00				2 73	1065 47	182 74	1248 21		W. J. Little	J. G. Conklin	Oct. 22
Haverford st., from Thirty-third to Thirty-fourth sts.	2 ft. 3 in. x 1 ft. 6 in.	400									2 05							
	12-inch pipe	24				3	25 00				1 10	921 40		921 40	143 57	W. P. Brown	John McParland	Nov. 18
Hare st., from Twenty-second to Twenty-third sts.	3 ft. 0 in. x 2 ft. 0 in.	315	3	2	81 00	3	25 00				1 95	689 42	135 58	825 00		Wm. Yetter	G. W. Hansell	Dec. 24
Jefferson st., from Mervine to Twelfth sts.	2 ft. 3 in. x 1 ft. 6 in.	208				2	25 00				2 13	437 50	62 14	499 64		D. J. Davis	H. S. Hong	April 7
Jasper st., from the sewer in Somerset st. to a point 310 ft. s. e. of said Somerset st.	3 ft. 0 in. x 2 ft. 0 in.	312.25				2	25 00				2 50	813 88	16 74	830 62		Jno McCormick	John M. Mack	April 24
Jefferson st., from Pink to Lawrence sts.	2 ft. 3 in. x 1 ft. 6 in.	381.00				2	25 00				2 20	598 00	275 00	873 00		C. R. Van Horn	P. C. & T. McEntee	July 24
Jeannette st., from Manayunk to Freeland avs.	2 ft. circumference	752.46				6	40 00				4 25							
	8-inch pipe	760.45	2	6	87 00	4	25 00				2 20	2151 38	3581 57	5732 95		F. J. Watt	H. C. Eyre	Aug. 6
Jefferson st., from Thirtieth to Twenty-eighth sts.	3 ft. 0 in. x 2 ft. 0 in.	900				5	25 00				2 87	2160 00	548 00	2708 00		Jas. McGill	John M. Donnelly	Nov. 28
Jasper st., from Hart lane to Cambria st.	2 ft. 9 in. circumf.	419.82	3	1	81 00	2	25 00				2 65	1030 18	213 34	1243 52		P. F. Brown	W. P. Clement	Dec. 3

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Knox st., from Chelton ave. to Lehman st., and on Chelton ave., from Wayne to Green sts.	3 ft. 3 in. x 2 ft. 2 in.	1037.5									$2 72							
	2 ft. 3 in. x 1 ft. 6 in.	519.5	2	1	$87 00						2 47							
	12-inch pipe	27	3	2	81 00	8	$25 00				1 10	$3591 35	$925 36	$4516 71		J. G. Moore	Nolan & Regan	Feb. 28
Kalos st., from Ridge ave. to Righter st.	2 ft. circumference	947.70				8	40 00				4 25							
	8-inch pipe	953.86	2	3	87 00	2	25 00				2 20	2402 41	4354 80	6757 21		F. J. Watt	H. C. Eyre	May 4
Knox st., from Coulter to Queen sts.	2 ft. 3 in. x 1 ft. 6 in.	704	3	1	81 00	5	25 00				2 18	1656 77	83 95	1740 72		John Able, Jr.	D. McMahon	Sept. 26
Kensington av., from Somerset to Cambria sts.	3 ft. x 2 ft.	739.66									2 45							
	12-inch pipe	43	3	2	81 00	4	25 00				1 10	1754 24	367 24	2121 48		D. J. Davis	Geo. W. Ruch	Oct. 13
Longshore st., from Spring to Jackson sts.	4 ft. 6 in. x 2 ft. 3 in.	1403.41									4 85							
	4 ft. 0 in. x 2 ft. 8 in.	450.95									4 50							
	3 ft. 6 in. x 2 ft. 4 in.	435.91									3 60							
	3 ft. 3 in. x 2 ft. 2 in.	465.99	2	10	87 00						2 75							
	3 ft. x 2 ft.	451.80	3	4	81 00	16	25 00				2 45	7232 28	7074 28	14306 56		A. Ruth, A. Durr	H. C. Eyre	Feb. 3
Lawrence st., from George to Calvert sts.	2 ft. 3 in. x 1 ft. 6 in.	500				3	25 00				2 21	1180 00		1180 00	$222 44	Aug. Durr	Jos. Johnson	April 11
Locust st., east from Thirty-eighth st.	12-inch pipe	63									1 90	73 00	37 00	110 00		James McGill	H. S. Houg	April 19
Lyceum av., from Pechin to Mitchell sts.	2 ft. 3 in. x 1 ft. 6 in.	529	3	1	81 00	4	25 00				2 99	1500 00	85 80	1585 80		C. Y. Lauderbach	J. M. Donnelly	July 11
Lex st., from Fairmount av. to Brown st.	2 ft. 3 in. x 1 ft. 6 in.	388									2 25							
	12-inch pipe	15	3	1	81 00	3	25 00				1 10	917 00	128 50	1045 50		N. B. Beans	James Deehan	July 28
Lehigh av., from the sewer in Fifth st. to Fairhill st., thence on Fairhill st. 240 ft. from northeast of Lehigh avenue.	3 ft. x 2 ft.	377.91									2 05							
	2 ft. 6 in. x 1 ft. 8 in.	248.80	3	2	81 00	3	25 00				1 95	960 91	536 37	1497 28		Aug. Durr	Burns & Higgins	Aug. 18

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Cost per foot.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Laurel st., from Front st. to Frankford av.	12-inch pipe	669				6	$25 00				$1 79	$1347 51		$1347 51	$262 85	D. J. Davis	H. S. Hong	Aug. 23
Lehman & Marion sts., from Knox to Rittenhouse sts.	2 ft. 3 in. x 1 ft. 6 in.	645	3	1	81 00	4	25 00				2 24	1684 79	28 01	1712 80		S. H. Collom	D. McMahon	Sept. 24
Lawrence st., from Brown to Poplar sts.	2 ft. 3 in. x 1 ft. 6 in.	755	3	3	81 00	5	25 00				2 13	1953 79		1953 79	1 64	Thos. D. Hooper	B. F. Shelmire	Sept. 29
Mt. Vernon st., from Thirty-eighth st. to sewer	2 ft. 3 in. x 1 ft. 6 in.	339									2 37							
	12 inch pipe	39				2	25 00				1 10	896 33		896 33	1 40	C. R. Van Horn	W. H. H. Achuff	April 12
Marshall st., from Norris to Diamond sts.	2 ft. 3 in. x 1 ft. 6 in.	573	2	1	87 00	3	25 00				2 25	1396 27	54 98	1451 25		Con. F. Brown	W. H. Yoast	May 22
Master st., from the sewer in Thirty-first st. to a point 330 ft. west of Thirty-first st	2 ft. 3 in. x 1 ft. 6 in.	236				2	25 00				5 15	456 00	809 40	1265 40		T. A. Brackney	T. P. Smart	June 7
Miller st., from Wisteria ave. to Wister st.	2 ft. 3 in. x 1 ft. 6 in.	833.5	2	1	87 00	4	25 00				2 57	2316 60	12 49	2329 09		John Able, Jr.	John Kerrigan	June 18
Mascher st., from Norris to Diamond sts.	3 ft. 0 in. x 2 ft. 0 in.	525				5	25 00				2 18	1269 50		1269 50	99 15	John Vicary	W. H. Yoast	June 22
Meckliu st., from Wakefield st. to Germantown ave.,	3 ft. 0 in. x 2 ft. 0 in.	180	3	1	81 00						2 37							
and on Germantown ave. to the sewer at Seymour st	2 ft. 6 in. x 1 ft. 3 in.	907.5	2	1	87 00	7	25 00				2 47	2828 52	182 60	3011 12		John Able, Jr.	John Nolan	July 6
Manayunk ave., from Jannette to Sumac sts.	2 ft. circumference	344.67				4	40 00				4 25							
	8-inch pipe	346.66	2	1	87 00	1	25 00				2 20	560 00	1915 00	2475 00		F. J. Watt	H. C. Eyre	Aug. 6
Marston st., from the end of the present sewer to the s. c. l. of Columbia ave.	2 ft. 3 in. x 1 ft. 6 in.	237									2 25							
	12-inch pipe	5				2	25 00				1 10	585 50	3 25	588 75		S. R. Franklin	Jas. Deehan	Aug. 18
Montgomery ave., from Gaul to Belgrade sts.	3 ft. 0 in. x 2 ft. 0 in.	305.33	3	1	81 00	3	25 00				2 15	350 84	461 62	812 46		John Vicary	W. H. Yoast	Oct. 8

Length and Cost of Sewers Built during the year 1888—Continued.

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Monroe st., from Passyunk ave. to Fourth st.	3 ft. 0 in. x 2 ft. 0 in.	471	3	1	$81 00	3	$25 00	.....	.....	.....	$2 14	$1087 71	$126 23	$1163 94	.....	Aug. Durr	W. P. Clement	Oct. 9
Marlborough st., from Beach st. to Girard ave.	3 ft. 0 in. x 2 ft. 0 in.	1229	2	8	87 00	10	25 00	.....	.....	.....	2 24	2803 98	834 98	3698 96	*	Jas. McGill	H. C. Eyre	Oct. 11
Market st., from Twenty-first to Twenty-second sts.	3 ft. 0 in. x 2 ft. 0 in.	434	.....	.....	.....	.....	.....	.....	.....	.....	2 24							
	12-inch pipe	18	.....	.....	.....	3	25 00	.....	.....	.....	1 10	1066 96	.....	1066 96	$1 04	E. H. Sickles	D. M. Smart	Oct. 30
Mascher st., from Montgomery ave. to Berks st.	3 ft. 0 in. x 2 ft. 0 in.	577	2	3	87 00	4	25 00	.....	.....	.....	2 22	1170 00	471 94	1641 94	.....	Aug. Durr	W. H. Yoast	Nov. 9
Ninth st., from Somerset to Cambria sts.	2 ft. 6 in. x 1 ft. 8 in.	546.67	3	1	81 00	4	25 00	.....	.....	.....	2 25	1267 00	144 00	1411 00	.....	F. G. Ballentine	Geo. W. Ruch	May 16
Nineteenth st., from Westmoreland st. to Allegheny ave.; thence westward along Westmoreland to Twenty-first sts.	2 ft. 6 in. x 1 ft. 8 in.	1520.91	2	1	81 00	7	25 00	.....	.....	.....	1 98	3273 41	.....	3273 41	557 33	H. M. Smith	H. P. McTague	June 5
Nineteenth st., from Diamond st. to Susquehanna ave.	3 ft. 0 in. x 2 ft. 0 in.	541	3	1	81 00	3	25 00	.....	.....	.....	2 11	1297 51	.....	1297 51	92 49	E. H. Sickles	B. F. Shelmire	June 26
Nineteenth st., north from Race st. about 370 feet.	2 ft. 3 in. x 1 ft. 6 in.	453																
	12-inch pipe	3	.....	.....	.....	2	25 00	.....	.....	.....	2 17	628 50	407 81	1036 51	.....	James McGill	W. B. M. Conklin	June 26
Nineteenth st., from Parrish to Poplar sts.	3 ft. x 2 ft.	341	3	1	81 00	2	25 00	.....	.....	.....	1 95	795 95	.....	795 95	28 16	C. Y. Lauderbach	Geo. W. Hansell	July 26
Ninth st., from Susquehanna av. to Diamond st.	2 ft. 3 in. x 1 ft. 6 in.	576	.....	.....	.....	3	25 00	.....	.....	.....	2 09	1278 84	.....	1278 84	202 66	Jos. Hunter	Charles Smith	Oct. 27
Ninth st., from Reed to Dickinson sts.	3 ft. x 2 ft.	434.17	3	3	81 00	3	25 00	.....	.....	.....	2 06	991 09	221 29	1212 38	.....	William May	John Fullerton	Nov. 2
Nineteenth st., from Diamond to Norris sts.	2 ft. 3 in. x 1 ft. 6 in.	536	3	2	81 00	4	25 00	.....	.....	.....	2 04	1156 75	198 69	1355 44	.....	S. R. Franklin	J. P. Shelmire	Nov. 22

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Ontario st., from Ninth to Tenth sts	3 ft. 6 in. x 2 ft. 4 in.	433				3	$25 00				$3 00	$1185 87	$103 38	$1289 25		N. B. Beam	John M. Donnelly	Feb. 14
Ogden st., from Sixteenth st. to Ridge av	3 ft. x 2 ft	351				3	25 00				2 09	808 59		808 59	30	T. D. Hooper	B. F. Shelmire	May 16
Orianna st., from Dauphin st. to Susquehanna av	3 ft. x 2 ft	606	2	3	$87 00	5	25 00				2 23	1384 50	352 88	1137 38		W. P. Brown	Jos. Johnson	June 19
Orkney st., from Clearfield to Indiana sts	2 ft. 6 in. x 1 ft. 8 in. 15-inch pipe	100 440				5	25 00				2 15 1 73	1110 17		1110 17	$356 58	John Moore	John McParland	July 5
Otsego st., from Moore to Tasker sts	3 ft. x 2 ft	885.5	3	2	81 00	5	25 00				2 49	2170 13	321 76	2491 89		S. R. Franklin	James Deehan	Sept. 20
Olive st., from Twelfth to Thirteenth sts	12-inch pipe 3 ft. x 2 ft	95 356				3	25 00				1 10 2 27	893 02		893 02	89 72	F. G. Ballentine	W. B. M. Conklin	Oct. 10
Olive st., from Seventeenth to Eighteenth sts	3 ft. x 2 ft	425				3	25 00				2 15	988 75		988 75	132 82	Wm. Yetter	Geo. W. Hansell	Nov. 26
Orkney st., from the sewer in York st. southward	3 ft. x 2 ft	458	2	2	87 00	3	25 00				2 32	1225 98	85 58	1311 56		Con. F. Brown	W. P. Clement	Dec. 13
Orianna st., from York to Dauphin sts	3 ft. 0 in. x 2 ft. 0 in.	524	4	1	87 00	5	25 00				2 21	1276 00	94 04	1370 04		C. F. Brown	John Bonhage	Dec. 14
Pastorius st., from Germantown ave. to Hancock st	2 ft. 6 in. x 1 ft. 8 in.	818.5				4	25 00				3 85	2132 80	1118 42	3251 22		S. H. Collom	John McParland	March 5
Preston st., from Lancaster to Fairmount avs	2 ft. 6 in. x 1 ft. 8 in.	393	2	1	87 00	3	25 00				2 09	843 57	139 80	983 37		T. A. Brackney	John Noonan	April 4
Palethorp st., from s. c. l. of York st. to the sewer in Dauphin st	3 ft. 0 in. x 2 ft. 0 in.	532	2	1	87 00	4	25 00				2 20	1362 72		1352 72	58 28	John Vleary	W. H. Yoast	April 30
Parrish st., from Fifteenth to Carlisle sts	12-inch pipe 3 ft. 0 in. x 2 ft. 0 in.	8 236				2	25 00				1 10 2 27	535 16	53 86	589 02		Jas. McGill	W. B. M. Conklin	June 9
Pastorius st., from Hancock to Oscoola sts	3 ft. 0 in. x 2 ft. 0 in.	364.66				3	25 00				3 00	1027 91	141 09	1169 00		C. P. McCalley	John Nolan	June 27

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. feet built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Parrish st., from Nineteenth to Twenty-second sts.	12-inch pipe	434	3	1	$81 00	1 2	$40 00 25 00				$1 67	$894 58	$1 20	$895 78		T. D. Hooper	Burns & Higgins	July 30
Philip st., from s. c. l. of Susquehanna ave. to Diamond st	3 ft. 0 in. x 2 ft. 0 in.	573.41	2	2	87 00	5	25 00				2 21	1523 26	42 90	1566 95		Wm. May	Jos. Johnson	Aug. 3
Philip st., from end of old sewer to sewer in Berks st.	3 ft. 0 in. x 2 ft. 0 in.	164	3	1	81 00	2	25 00				2 75	435 99	114 01	550 00		Wm. May	Geo. W. Rinch	Aug. 3
Pine st., between Second and Third sts.; also between Fourth and Fifth sts.	3 ft. 0 in. x 2 ft. 0 in. 12-inch pipe	924 33				6	25 00				2 43 1 10	1987 49	444 13	2431 62		Jas. Duffy	H. C. Eyre	Sept. 6
Pierce st., between Seventh and Eighth sts.	3 ft. 0 in. x 2 ft. 0 in.	421.5	3	1	81 00	3	25 00				2 47	1022 75	174 85	1197 10		T. A. Brackney	H. Smart	Sept. 8
Price st., from Hancock st. to the sewer in Engle st.	2 ft. 3 in. x 1 ft. 6 in.	571	3	1	81 00	2	25 00	22	5	110 00	4 40	1600 60	1111 33	2711 93		S. H. Collom	John M. Mack	Sept. 10
Pearl st., from Thirty-fourth to Thirty-fifth sts.	2 ft. 3 in. x 1 ft. 6. in	445				3	25 00				1 93	932 88		932 88	131 65	Yetter & Hunter John Able, Jr.	John McParland	Nov. 17
Penn st., from Patton ave. s. w. about 660 ft.	3 ft. 0 in. x 2 ft. 0 in.	665	8 2	1 2	81 00 87 00	3	25 00	4	5	20 00	2 20		1813 00	1813 00		D. J. Davis	John Nolan	Oct. 8
Philip st., from Oxford to Jefferson sts.	2 ft. 3 in. x 1 ft. 6 in. 12-inch pipe	880 8				3	25 00				2 11	885 60		885 60	112 57	F. G. Ballentine	W. B. M. Conklin	Dec. 6
Ridge ave., from intercepting sewer to Osbourne st.	8-inch pipe 3 ft. circumference	1261.55 205									4 71 5 23							
Race st., from Thirty-sixth to Thirty-fifth sts.	2 ft. 6 in. circumf. 2 ft. 3 in. x 1 ft. 6 in. 12-inch pipe	260.13 314 9	2	7	87 00	10 3	40 00 25 00	21	5	105 00	5 23 1 97 1 10	1547 14	7894 32 83 95	9441 46 703 48		F. J. Watt T. A. Brackney	H. C. Eyre John Noonan	April 2 May 18
Randolph st., from Poplar st. to Girard ave.	3 ft. 0 in. x 2 ft. 0 in.	1178	3	1	81 00	7	25 00				2 19	2835 82		2835 82	06	Aug. Durr	Jos. Johnson	May 25
Rittenhouse st., from Wayne to Pulaski ave.	12-inch pipe	403	3	2	81 00	4	25 00				2 40	599 81	579 39	1179 20		S. H. Collom	D. McMahon	Sept. 17

Length and Cost of Sewers Built during the year 1888—Continued.

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Redner st., from Twenty-fourth to Twenty-third sts	2 ft. 3 in. x 1 ft. 6 in.	435									$2 25							
	12-inch pipe	6				3	$25 00				1 10	$1060 35		$1060 35	$7 65	Geo. Moore	P. C. & J. McEntee	Sept. 27
Robinson st., from Eyre to Palmer sts	3 ft. 0 in. x 2 ft. 0 in.	200	2	3	$87 00	2	25 00				2 23	416 79	$340 21	757 00		F. G. Ballentine	J. G. Conklin	Dec. 10
Susquehanna ave., from Seventeenth to Eighteenth sts	3 ft. 0 in. x 2 ft. 0 in.	408	2	2	87 00	2	25 00				2 10	833 00	225 00	1058 00		E. H. Sickels	John M. Donnelly	Feb. 2
Susquehanna ave., from Seventeenth to w. h. l. of Seventeenth sts., to Park ave. or Diamond st	3 ft. 0 in. x 2 ft. 0 in.	470									2 07							
	2 ft. 3 in. x 1 ft. 6 in.	548	3	2	81 00	7	35 00				1 96	2147 00	236 28	2383 98		E. H. Sickels	H. P. McTague	Mar. 15
Sommerville st., from Tenth to Eleventh sts	2 ft. 3 in. x 1 ft. 6 in.	361.5	3	1	81 00	2	25 00				2 15	908 22		908 22	19 78	Jos. Hunter	P. C. & J. McEntee	April 21
Somerset st., from Sixth to Seventh sts	15-inch pipe	479.75				4	25 00				2 25	553 14	626 29	1179 43		N. B. Beam	Geo. W. Ruch	April 24
Seventeenth st., from Addison to Lombard sts	12-inch pipe	113				1	25 00				1 89	216 50	22 07	238 57		S. R. Franklin	H. S. Hong	May 1
Spring Garden st., from Thirty-seventh to Thirty-eighth	2 ft. 3 in. x 1 ft. 6 in.	213									2 09							
	12-inch pipe	14				1	25 00				1 13	466 40		466 40	133 60	T. A. Brackney	John Noonan	May 2
Sixth st., from Barclay to Spruce sts	2 ft. 3 in. x 1 ft. 6 in.	224.5									2 49							
	12-inch pipe	19				1	25 00				1 10	511 75	93 15	604 90		W. P. Brown	H. Smart	May 5
Second st., from Pine to South sts	3 ft. x 2 ft.	672	3	3	81 00	4	25 00				2 65	896 49	1227 34	2123 80		C. R. Van Horn	R. Patton & Co	May 7
Spruce st., from Twelfth to Thirteenth sts	3 ft. x 2 ft.	390	3	2	81 00	3	25 00				2 10	1056 00		1056 00	22 50	Wm. J. Little	Edward McCann	May 18
Simes st., fr. Twentysecond to Twenty-third sts., and on Twenty-third st., from Simes to Market sts	2 ft. 3 in. x 1 ft. 6 in.	161				1	40 00				2 14							
	12-inch pipe	288.5	3	1	81 00	3	25 00				1 73	1036 18		1036 18	5 26	E. H. Sickels	H. S. Hong	May 24

Length and Cost of Sewers Built during the year 1888—Continued.

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's. No. built.	Manhol's. Cost each.	Wellholes. No. built.	Wellholes. Per foot.	Wellholes. Total cost.	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
Spring Garden st., from Fortieth to Preston sts.	2 ft. 3 in. x 1 ft. 6 in.	427									$1 94							
	12-inch pipe	66				3	$25 00				1 10	$823 78	$152 26	$975 98		N. B. Beam	John Noonan	May 25
Spring Garden st., fr. Thirty-ninth st. eastward to 100 feet west of Thirty-eighth st.	2 ft. 3 in. x 1 ft. 6 in.	516									1 95							
	12-inch pipe	21				4	25 00				1 10	1109 38	19 92	1129 30		N. B. Beam	John Noonan	June 7
Susquehanna av., from Fifteenth to Sixteenth sts.	3 ft. x 2 ft.	428.66				3	25 00				2 25	880 57	168 93	1039 50		Jos. Hunter	P. & T. McEntee	June 8
Spring Garden st., fr. Thirty-fifth to Thirty-sixth sts.	2 ft. 3 in. x 1 ft. 6 in.	410									1 90							
	12-inch pipe	54				3	25 00				1 10	913 40		913 40	76 60	N. B. Beam	John Noonan	June 15
Susquehanna av., from Oriana to Third sts.	3 ft. x 2 ft.	155	2	2	$87 00	2	25 00				2 27	307 49	268 36	575 85		W. P. Brown	Jos. Johnson	June 18
South st., from Nineteenth to Twentieth sts.	2 ft. 3 in. x 1 ft. 6 in.	458.75	3	1	81 00	3	25 00				2 18	1156 07		1156 07	81 93	Aug. Durr	James Deehan	June 19
Sixth st., from Norris to Diamond sts.	3 ft. x 2 ft.	430				3	25 00				2 40	1107 00		1107 00	103 91	John Hunter	P. & T. McEntee	July 6
Susquehanna av., from 120 ft. east of Girard avenue.	12 inch pipe	120				1	25 00				1 87	249 40		249 40	38 59	Aug. Durr	J. G. Conklin	July 17
Spring Garden st., from Tenth to Eleventh sts.	3 ft. x 2 ft.	434									2 32							
	12-inch pipe	28				3	25 00				1 10	565 44	547 24	1112 68		James Duffy	H. C. Eyre	July 28
Sumac st., from Ridge ave. to Vicaris st.	8-inch pipe	2218.91				16	40 00				1 49							
	2 ft. 6 in. circumf.	2215.91	2	16	87 00	8	25 00	22	5	110 00	3 15	5856 13	6743 87	12600 00		F. J. Watt	H. C. Eyre	Aug. 8
Second st., from Beaver to Canal sts.	2 ft. 3 in. x 1 ft. 6 in.	300									2 17					James McGill		
	12-inch pipe	12	3	1	81 00	2	25 00				1 10	795 20		795 20	64 81	C. R. Van Horn	J. G. Conklin	Sept. 25
Second st., from Monroe to Balabridge sts.	3 ft. x 2 ft.	336									2 23							
	12-inch pipe	18	3	1	81 00	2	25 00				1 10	850 67	49 41	900 08		E. H. Sickels	Edward McCann	Sept. 26
Seventeenth st., from Susquehanna ave. to York st.	3 ft. x 2 ft.	1130	3	4	81 00	6	25 00				2 00	2734 00		2734 00	157 26	S. Cox	H. Smart	Sept. 26

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total.		In assessment bills.	In city warrants.					
Sansom st., from Forty-third to Forty-second st.	2 ft. 3 in. x 1 ft. 6 in.	628									$3 49							
	12-inch pipe	32	3	2	$81 00	4	$25 00	15	5	$75 00	1 10	$1525 19	$1038 73	$2563 92		N. B. Beam	John Noonan	Oct. 1
Smedley st., from Westmoreland to Ontario sts.	12-inch pipe	542				4	25 00				1 95	1156 90		1156 90	$98 10	John G. Moore	J. McParland	Oct. 15
Seventeenth st., from Master to Jefferson sts.	2 ft. 3 in. x 1 ft. 6 in.	497									1 90							
	12-inch pipe	18				3	25 00				1 10	1039 10		1039 10	279 02	Wm. Yetter	Geo. W. Hansell	Oct. 20
Sixteenth st., from Wharton to Federal sts., and on Federal st., from Seventeenth to Eighteenth sts.	3 ft. 6 in. x 2 ft. 4 in.	1015									2 13							
	12-inch pipe	12	3	4	81 00	7	25 00				1 10	2413 14	260 75	2674 15		James Duffy	H. Smart	Oct. 29
Shamokin st., from Twenty-second to Barney sts.	3 ft. x 2 ft.	236	3	2	81 00	1	25 00				3 33	503 98	468 90	972 00		Thos. Cooper	H. S. Hong	Nov. 8
Spruce st., from Forty-third to Forty-fifth sts.	2 ft. 3 in. x 1 ft. 6 in.	794.4	3	2	81 00	4	25 00				3 25	1971 87	881 68	2853 55		W. Penn Brown	James Deehan	Nov. 13
Sixth st., from St. Mary to South sts.	2 ft. 3 in. x 1 ft. 6 in.	128									2 74							
	12-inch pipe	20				1	25 00				1 10		397 72	397 72		George Moore	D. M. Smart	Nov. 13
School st., from Wayne st. to Germantown av.	3 ft. 6 in. x 2 ft. 4 in.	727.5									2 97							
	3 ft. 3 in. x 2 ft. 2 in.	1137.5	3	6	81 00						2 97					John Able, Jr.		
	12-inch pipe	20	2	2	87 00	10	25 00				1 10	4060 59	2410 45	6471 04		D. J. Davis	John Nolan	Dec. 14
Scott or Wilder st., from Eighth to Ninth sts.	3 ft. 0 in. x 2 ft. 0 in.	427.75									2 30							
	12-inch pipe	6	3	1	81 00	8	25 00				1 10	971 26	175 16	1146 42		T. A. Brackney	James Deehan	Dec. 19
Tiernan st., from Tasker st. northward	3 ft. 0 in. x 2 ft. 0 in.	272				1	25 00				1 88	536 36		536 36		Jas. Duffy and Geo. Moore	T. P. Smart	Jan. 28
Thirty-first st., from Baring to Spring Garden sts.	2 ft. 3 in. x 1 ft. 6 in.	539	2	1	87 00	4	25 00				4 29	1294 46	1204 85	2499 31		Jas. Duffy	John McParland	April 25
Thirty-sixth st., from Haverford to Wallace sts.	2 ft. 3 in. x 1 ft. 6 in.	419.7	3	2	81 00	3	25 00				2 09	879 99	263 88	1143 87		Jas. Duffy	John McParland	April 27

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimates.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bill.	In city warrants.					
Townsend st., from Cedar to Memphis sts.	3 ft. 0 in. x 2 ft. 0 in.	40				3	$25 00				$2 87	$1009 30	$39 77	$1049 07		John Vicary	W. B. M. Conklin.	May 9
Twentieth st., from Market to Johnson sts.	12-inch pipe	5½									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	336.58	3	2	$81 00	2	25 00				2 08	699 13	218 32	917 95		E. H. Sickels	T. P. Smart	May 15
Twenty-ninth st., from Susquehanna to Ridge aves.	3 ft. 0 in. x 2 ft. 0 in.	942.5									2 13							
	12-inch pipe	9	3	3	81 00	6	25 00				1 10	1949 38	461 03	2410 42		Jas. Duffy	John McParland	May 22
Tenth st., from the sewer in Berks st. to the s. c. of Hart st., and on Hart st. to 14 ft. east of Warnock st.	2 ft. 3 in. x 1 ft. 6 in.	317	3	1	81 00	2	25 00				2 20	728 50	74 90	803 40		D. J. Davis	Henry Smart	May 28
Thirty-first st., from Ridge ave. to the sewer in Susquehanna ave., and from the middle of Susquehanna ave. to the sewer in Dauphin st.	2 ft. 6 in. x 1 ft. 8 in.	807	3	1	81 00	5	25 00				2 00	1377 87	442 13	1820 00		Wm. Yetter	Geo. W. Hansell	June 15
Thirty-fourth st., from Fairmount av. to Haverford st.	12-inch pipe	36									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	837	3	4	81 00	6	25 00				2 18	1849 88	446 53	2296 41		Jas. Duffy	James Dechan	June 22
Tahassa st., fr. Ninth to Tenth sts.	2 ft. 3 in. x 1 ft. 6 in.	440	3	1	81 00	2	25 00				2 05	965 17	67 83	1033 00		Wm. P. Brown	John McParland	July 19
Twentieth st., from Dauphin to York sts.	3 ft. 0 in. x 2 ft. 0 in.	541	3	2	81 00	2	25 00				2 20	1200 00	227 20	1427 20		Jos. Hunter	P. C. & T. McEntee	July 27
Twenty-ninth st., from Susquehanna ave. to Herman st.	12-inch pipe	68									1 00							
	2 ft. 3 in. x 1 ft. 6 in.	850	3	4	81 00	5	25 00				1 95	2086 86	80 65	2167 51		Wm. Yetter	Geo. W. Hansell	July 30
Twentieth st., from the sewer in Dauphin st. to the n.e.l. of Susquehanna ave.	2 ft. 3 in. x 1 ft. 6 in.	561	3	2	81 00	3	25 00				1 97	645 00	697 17	1342 17		John G. Moore	John McParland	Aug. 9

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets. Size.	Inlets. No. built.	Inlets. Cost each.	Manhol's No. built.	Manhol's Cost each.	Wellholes. No. built.	Wellholes. Per foot.	Wellholes. Total cost	Cost per foot.	Payment. In assessment bills.	Payment. In city warrants.	Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate
Twenty-eighth st., from Mt. Pleasant to Jefferson st....	3 ft. x 2 ft.	1,188	3	1	$81 00	7	$25 00	....	....	....	$2 00	$2632 00	....	$2632 00	$70 65	S. Franklin	James Deehan	Aug. 17
Twenty-first st., between Allegheny ave. and s. c. l. of Ontario st.	12-in. pipe	20	....	....	....	....	....	....	....	....	1 10					John G. Moore.		
	8 ft. x 2 ft.	536	3	2	81 00	3	25 00	....	....	....	2 25	983 83	$481 67	1465 00	....	Jno. McCormick	Peter P. Deehan	Aug. 18
Twenty-first st., from Market st. 100 ft. s. from Chestnut st.	12-inch pipe	5	....	....	....	....	....	....	....	....	1 10							
	12-inch pipe	112	....	....	....	1	25 00	....	....	....	1 84	164 00	72 58	236 58	....	E. H. Sickels	H. Smart	Aug. 20
Twenty-first st., from Cuthbert to Filbert sts.	12-inch pipe	8	....	....	....	....	....	....	....	....	1 10							
	12-inch pipe	137	....	....	....	1	25 00	....	....	....	1 84	285 88	....	285 88	38 13	E. H. Sickles	H. Smart	Aug. 20
Thompson st., from Eighteenth to Nineteenth sts.	3 ft. x 2 ft.	412	3	1	81 00	2	25 00	....	....	....	1 82	880 84	....	880 84	183 66	Aug. Durr	Burns & Higgins	Aug. 28
Tenth st., from Dauphin to Nevada sts., thence on Nevada to sewer on Eleventh	12-inch pipe	15	....	....	....	....	....	....	....	....	1 10							
	2 ft. 3 in. x 1 ft. 6 in.	421.5	3	1	81 00	3	25 00	....	....	....	2 30	954 45	187 50	1141 95	....	S. R. Franklin	James Deehan	Aug. 29
Twelfth st., from Lehigh ave. to Somerset st.	2 ft. 3 in. x 1 ft. 6 in.	557	3	1	81 00	4	25 00	....	....	....	1 93	773 98	250 00	1023 98	....	Jos. Hunter	Jas. L. Murray	Sept. 27
Twenty-ninth st., from Thompson to Jefferson sts.	12-inch pipe	9	3	2	81 00	....	....	....	....	....	1 10							
	3 ft. x 2 ft.	978	2	4	87 00	6	25 00	....	....	....	2 26	2,244 63	635 55	2880 18	....	Jas. McGill	H. C. Eyre	Nov. 12
Thirty-seventh st., from Centre to Filbert sts.	12-inch pipe	27	....	....	....	....	....	....	....	....	1 10							
	2 ft. 3 in. x 1 ft. 6 in.	185	....	....	....	2	25 00	....	....	....	2 03	455 25	....	455 25	50 18	Jas. Duffy	H. Smart	Nov. 27
Tioga st., from Broad st. to Germantown ave.	12-inch pipe	9	....	....	....	....	....	....	....	....	1 10							
	2 ft. 3 in. x 1 ft. 6 in.	583	3	1	81 00	4	25 00	....	....	....	1 90	955 98	342 62	1298 60	....	John Vicary	R. Higgins	Dec. 17
Tenth st., from Germantown ave. to Cumberland st.	2 ft. 3 in. x 1 ft. 6 in.	266.5	....	....	....	2	25 00	....	....	....	2 23	605 46	38 83	644 29	....	John Vicary	Geo. W. Rush	Dec. 20
Twenty-seventh st., from Sedgley ave. to Susquehanna ave.	12-inch pipe	42	....	....	....	....	....	....	....	....	1 10							
	2 ft. 3 in. x 1 ft. 6 in.	337	....	....	....	3	25 00	....	....	....	1 87	751 39	....	751 39	111 08	Jos. Hunter	Fred. Sterke	Dec. 24

Length and Cost of Sewers Built during the year 1888—(Continued).

Location.	Size.	Length in feet.	Inlets.			Manhol's		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Turner st., from Erie to Butler sts	3 ft. 0 in. x 2 ft. 0 in.	603.4	2	2	$87 00	5	$25 00	10	5	$50 00	$2 27	$1326 51	$404 27	$1730 78	.....	Jas. Duffy	John M. Donnelly	Dec. 27
Vine st., from Tenth to Eleventh sts	12-inch pipe	31									1 10							
	3 ft. 0 in. x 2 ft. 0 in.	420.75	3	1	81 00	3	25 00				2 49	1136 52	101 24	1237 76	.....	John Vicary	W. B. M. Conklin	Nov. 13
Venango st., from Eighteenth to Twentieth sts	3 ft. 6 in. x 2 ft. 4 in.	845	3	4	81 00	2	25 00	14.5	5	72 50	2 87	2224 00	467 29	2691 29	.....	John G. Moore	John McParland	Aug. 22
Venango st., from Twentieth to Twenty-second sts, and on Twenty-second st. to Hunting Park ave	12-inch pipe	73									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	1590.25	3	1	81 00	3	25 00	7652	5	382 60	8 87	3508 48	11215 95	14724 41	.....	John G. Moore	John McParland	Dec. 5
Wakefield st. and Wisteria ave. to the Philadelphia and Germantown ave	2 ft. 6 in. x 1 ft. 8 in	858									2 60							
	4 ft. 0 in. x 2 ft. 8 in.	435									6 90							
	4 ft. 3 in. x 2 ft. 10 in.	382									7 42							
	4 ft. 6 in. x 3 ft. 0 in.	452									9 42							
	4ft 0 in x 2 ft 8 in (s.b)	180	3	10	81 00						8 69							
	4 ft 0 in x 2 ft 8 in (r.r)	186	1	2	96 00	12	25 00	84	5	420 00	13 80	5912 68	12028 09	17940 77	.....	John Able, Jr	H. C. Eyre	March 1
Woodland ave., from Forty-third to Forty-seventh sts.	3 ft. 6 in. x 2 ft. 4 in.	580									7 95							
	3 ft. 3 in. x 2 ft. 2 in.	497	3	2	81 00	6	25 00				7 95	2544 89	6321 31	8866 20	.....	S. Cox & J. Duffy	John McParland	April 23
Warren st., between Thirty-third and Thirty-fourth sts	2 ft. 3 in. x 1 ft. 6 in.	326									2 27							
	12-inch pipe	24				2	25 00				1 10	810 76	5 66	816 42	.....	T. A. Brackney	John Noonan	May 2
Wildey st., from Susquehanna ave. to Vienna st	3 ft. 0 in. x 2 ft. 0 in.	318	2	2	87 00	3	25 00				2 21	507 46	444 32	951 78	.....	Jas. McGill	W. B. M. Conklin	May 31
Waterloo st., from Columbia to Montgomery aves	8 ft. 0 in. x 2 ft. 0 in.	633				4	25 00				2 37	1600 21	.....	1600 21	$66 61	John Vicary	W. H. Yoast	June 9
Warren st., between Rebecca and Forty-first sts	12-inch pipe	12									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	477				3	25 00				1 89	989 73	.....	989 73	242 68	N. B. Beam	Burns & Higgins	Sept. 13
Wildey st., from Montgomery ave. to Vienna st	12-inch pipe	9									1 10							
	3 ft. 0 in. x 2 ft. 0 in.	357	3	1	81 00	3	25 00				2 09	721 28	190 75	912 03	.....	John Vicary	W. H. Yoast	Oct. 4

Length and Cost of Sewers Built during the year 1888—Continued.

Location.	Size.	Length in feet.	Inlets.			Manholes		Well Holes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Warren st., from Sloan to Baring sts	2 ft. 3 in. x 1 ft. 6 in.	658	3	2	$81 00	4	$25 00	.....	.....	.....	$1 97	$1549 45	$8 81	$1558 26	.....	N. B. Beam	John Noonan	Oct. 8
Wellington st., from sewer in Jasper st. to s. e. l. of Kensington ave	2 ft. 6 in. x 1 ft. 8 in.	568.58	2	1	87 00	4	25 00	.....	.....	.....	2 00	1324 16	.....	1324 16	161 21	Aug. Burr	W. H. Yoast	Dec. 18
Woodbine st., from Willow to Wilson st., or Magnolia ave	15-inch pipe	40	3	1	81 00													
			2	1	87 00	.....	.....	.....	.....	.....	1 35							
	3 ft. 0 in. x 2 ft. 0 in.	468	1	1	96 00	2	25 00	.....	.....	.....	2 90	1317 69	407 51	1725 2	.....	S. H. Collom	John Nolan	Dec. 17
York st., from Fifteenth to Sixteenth sts	3 ft. 0 in. x 2 ft. 0 in.	452.67	3	1	81 00	3	25 00	.....	.....	.....	2 35	988 05	231 71	1219 76	.....	Jos. Hunter	John McParland	June 7
York st., from Sedgley ave. to Twenty-fourth st	2 ft. 3 in. x 1 ft. 6 in.	245	3	2	81 00	2	25 00	.....	.....	.....	2 18	475 62	270 48	746 10	.....	Geo. Moore	P. C. & T. McEntee	Oct. 15
York st., from Twenty-seventh to Twenty-ninth sts	2 ft. 6 in. x 1 ft. 8 in.	819	3	3	81 00	5	25 00	.....	.....	.....	1 89	1804 34	111 57	1915 91	.....	W. J. Little	John Bonbage	Dec. 15

Branch Sewers in Progress, but not Completed in 1888.

Location.	Size.	Length in feet.	Inlets.			M'nholes		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Sixth st., from the sewer in Clearfield st. to the Connecting Railway	3 ft. cir.	700									$7 00		$5920 00			C. R. Van Horn.	W. H. H. Achuff.	
Haverford st., from the sewer west of Forty-sixth st. to Forty-sixth st., and on Forty-sixth st., from Haverford st. to Fairmount ave. on Fairmount ave., from Forty-sixth to Forty-third sts., and on Forty-fourth st., from Fairmount ave. to Seneca st.	4 ft. 6 in. x 2 ft. 8 in.	668									5 10							
	3 ft. 6 in. x 2 ft. 4 in.	667									2 99							
	2 ft. 3 in. x 1 ft. 6 in.	406									2 10	$3623 50	1379 49			N. B. Beam.	John Noonan.	

Branch Sewers Completed in 1888, but Final Estimate in 1889.

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wellholes.			Cost per foot.	Payment.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Ann st., from Eighteenth st. to a point 144 ft. west of Nineteenth st.	15-in pipe	450.58				2	$25 00				$2 69							
	12-in pipe	171.75	3	1	$81 00	2	40 00				2 26		$1827 71	$1827 71		Jno. McCormick	H. S. Hong	Jan. 8
Ann st., from Seventeenth to Eighteenth sts.	3 ft. 0 in. x 2 ft. 0 in.	448				2	25 00				3 40		1573 20	1573 20		Jno. McCormick	D. M. Smart	Jan. 7
Emily st., from Eleventh to Twelfth sts.	3 ft. 0 in. x 2 ft. 0 in.	429.75	3	1	81 00	3	25 00				2 38	$1047 05	131 75	1178 80		Wm. Yetter	D. M. Smart	Jan. 9
Forty-fifth st., from Sansom to Market sts.	2 st. 6 in. x 1 ft. 8 in.	800				4	25 00	16.8	5 00	$84 00	3 25	1462 67	1305 33	2768 00		W. P. Brown	R. F. Shehuire	Jan. 5
Fifteenth st., from Ellsworth to Federal sts.	3 ft. 0 in. x 2 ft. 0 in.	386.33	3	2	81 00	3	25 00				2 00	877 83	100 00	977 83		Jno. McCormick	H. Smart	Jan. 10
Girard ave., from W. College ave. to Tuney st	12-in. pipe	14									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	490	3	1	81 00	2	25 00				1 93	493 48	598 62	1092 10		E. H. Sickels	Jno. Bonhage	Jan. 8
Master st., from the sewer in Fifty-first st. westward 250 ft.	2 ft. 3 in. x 1 ft. 6 in.	273.5	3	1	81 00	2	25 00				2 43	677 99	117 61	795 60		H. M. Smith	H. S. Hong	Jan. 8
Morris st., from Sixteenth to Seventeenth sts.	3 ft. 0 in. x 2 ft. 0 in.	463	3	6	81 00	3	25 00				1 98	680 00	797 74	1477 74		W. J. Little	H. Smart	Jan. 10
Pearl st., from Sixteenth to Seventeenth sts.	12-in. pipe	9									1 10							
	3 ft. 0 in. x 2 ft. 0 in.	427	3	1	81 00	3	25 00				2 96	1069 02	360 80	1429 82		T. D. Hooper	W. P. Clement	Jan. 11
Tenth st., from Ontario to Tioga sts.			2	1	87 00													
	3 ft. 0 in. x 2 ft. 0 in.	544.75	3	1	81 00	4	25 00				2 60	1320 04	364 81	1084 85		T. Cooper	H. S. Hong	Jan. 9
Sedgley ave., from Ridge to Susquehanna aves.	12-in. pipe	21									1 10					Wm. Yetter...		
	3 ft. 0 in. x 2 ft. 0 in.	1516.5	2	4	87 00	9	25 00				1 89	3153 16	309 12	3462 28		Jos. Hunter...	Geo. W. Hansell	Jan. 10
Sedgley ave., from Dauphin to York sts.	12-in. pipe	22									1 10							
	2 ft. 3 in. x 1 ft. 6 in.	783	3	4	87 00	5	25 00				1 90	1625 32	335 58	1960 90		S. R. Franklin	Fred. Starke	Jan. 14
Twenty-second st., from Kimball st. to Washington ave.	3 ft. 0 in. x 2 ft. 0 in.	356.58	3	2	81 00	2	25 00				2 70	679 97	494 80	1174 77		Jas. McGill	Jno. Fullerton	Jan. 3

Branch Sewers Completed in 1888, but Final Estimate in 1889—(Continued.)

Location.	Size.	Length in feet.	Inlets.			Manhol's.		Wellholes.			Cost per foot.	Payments.		Total cost.	Excess bills and balances.	Inspectors.	Contractors.	Date of final estimate.
			Size.	No. built.	Cost each.	No. built.	Cost each.	No. feet built.	Per foot.	Total cost.		In assessment bills.	In city warrants.					
Twenty-fifth st., from Sedgley ave. to York sts	2 ft. 6 in. x 1 ft. 8 in.	660	2	3	$87 00	4	$25 00	.....	.....	.....	3 02	$1412 17	$282 03	$1694 20	.....	S. R. Franklin	B. F. Shelmire	Jan. 4
Twenty-second st., from Federal to Dickinson sts.	2 ft. 3 in. x 2 ft. 4 in.	340	.....	.....	.....	.....	.....	.....	.....	.....	2 80							
	3 ft. 3 in. x 2 ft. 9 in.	410	.....	.....	.....	.....	.....	.....	.....	.....	2 72							
	2 ft. 6 in. x 1 ft. 8 in.	450	.....	.....	.....	.....	.....	.....	.....	.....	2 60							
	12-in. pipe	437	3	20	81 00	10	25 00	42	5	210 00	2 06	3400 73	2843 69	6244 42	.....	Jas. McGill	H. C. Eyre	Jan. 5
Twenty-first st., from Federal to Reed sts.	3 ft. 0 in. x 2 ft. 0 in.	316	.....	.....	.....	.....	.....	.....	.....	.....	2 30							
	2 ft. 6 in. x 1 ft. 8 in.	410	.....	.....	.....	3	25 00	.....	.....	.....	2 19							
	2 ft. 3 in. x 1 ft. 6 in.	461	3	10	81 00	4	40 00	.....	.....	.....	2 19	2368 99	1310 30	3679 29	.....	Jas. McGill	Jas. Deehan	Jan. 5

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS,

For the Year Ending December 31st, 1889,

AND

THIRD ANNUAL MESSAGE

OF

EDWIN H. FITLER,

Mayor of the City of Philadelphia,

WITH

ANNUAL REPORT

OF

LOUIS WAGNER,

Director of the Department of Public Works.

ISSUED BY THE CITY OF PHILADELPHIA.

1890.

PHILADELPHIA:
DUNLAP & CLARKE, PRINTERS AND BINDERS, 317-19-21 FILBERT STREET.
1890.

ANNUAL REPORT

OF THE

DEPARTMENT OF PUBLIC WORKS,

FOR THE YEAR 1889.

OFFICERS

OF THE

Department of Public Works.

Director,

LOUIS WAGNER.

Chief Clerk,

HARRY W. QUICK.

CLERK—WILLIS SHEBLE.

STENOGRAPHER AND CLERK—W. W. ALEXANDER.

STENOGRAPHER—ROBERT M. DOWNING.

TYPEWRITER—HARRY B. LAFFERTY.

MESSENGER—JAMES A. JUNIOR.

Superintendent of City Ice Boats,

H. E. MELVILLE.

Chiefs of Bureaus:

GAS—WILLIAM K. PARK.

HIGHWAYS—GEORGE A. BULLOCK.

LIGHTING—JOHN J. KIRK.

STREET CLEANING—SYLVESTER H. MARTIN.

SURVEYS—SAMUEL L. SMEDLEY.

WATER—JOHN L. OGDEN.

The operations of the Department were greatly hindered by the unprecedented rainfall, which not only prevented the regular and systematic prosecution of out-door work of all kinds, but also destroyed much of that partially constructed.

The damage to incomplete new structures was exceeded only by the injury done to the streets and sewers in many parts of the city, which were washed out and broken, rendering the former impassable and the latter dangerous to life and property.

These matters are set out in full detail in the reports of the bureaus having charge of this work, and are referred to here merely as a matter of public record.

The officer in charge of the signal corps stationed in Philadelphia, Sergeant T. F. Townsend, submits the following statement of the precipitation in Philadelphia during the year 1889:

	Number of days on which .01 inch or more rain fell.	Total precipitation.
January	11	3.75
February	10	2.00
March	12	2.58
April	14	3.17
May	15	4.32
June	13	3.39
July	17	8.29
August	12	7.07
September	17	4.66
October	13	3.76
November	15	6.76
December	10	0.85
Total	159	50.60

Yearly average rainfall for Philadelphia:

Signal Office,	1871–89	41.30
Pennsylvania Hospital,	1825–88	44.58
Central High School,	1852–81	45.94

It will be seen that for nearly one-half the year, rain or snow fell in excess of .01 of an inch daily, and that the total fall was 6.02 inches, or nearly 14 per cent., greater than the average from 1825 to 1888, as reported at the Pennsylvania Hospital, and 9.30 inches, over 22 per cent., greater than the average reported by the Signal Office during the years 1871–89.

As a result new work was delayed beyond the time expected, or agreed upon in contracts; much of it had to be repeatedly renewed at a loss to the contractors; whilst the repairing of streets and the rebuilding of sewers took months instead of weeks, and the cost of such repairs was largely in excess of first estimates—in fact, estimates were useless, for when the work of repairs was nearly completed a second or a third or a fourth storm not only carried away the work already done, but extended the breaks almost indefinitely.

The officers and employés in charge of this work should be highly commended for the faithful manner in which they met the unexpected calls for their time and labor, for they worked during all hours of the day and night, often at great personal risk of death or injury, to repair the damage done by the elements, and to this statement should be added the only other pleasing recollection of this season of disaster, that but a single fatal accident occurred.

It is hoped that a similar year of storms will never again visit our city.

The regular work of the Director's office, incident to the current business and to the extensions planned and prosecuted during the year, was largely increased by the washouts and storms before referred to, and this unexpected work was promptly met by the clerks and employés in the most satisfactory manner.

Under an ordinance approved March 29, 1887, the Bureau of Surveys was authorized to revise the lines and grades of the city plans along the Philadelphia and Trenton Railroad, from Tacony street to Pennypack creek, in the Twenty-third Ward, so that all grade crossings on the line of that railroad would be removed. These plans have just been completed and the officers of the Pennsylvania Railroad Company, lessees, have approved the same and agreed to make the necessary change at their sole cost and expense, except for land damages, constructing all overhead or undergrade bridges, and all other work incident to these changes. When work under this agreement has been completed there will remain but one or two other grade crossings on the line of this railroad, between their station at Broad and Market streets and the City line, and these will no doubt have the attention of Councils and of the Railroad Company at an early day.

The total length of main sewers on the first day of January, 1887, was 56.27 miles, and of branch sewers 221.02 miles. During 1887, 1888, and 1889, the Bureau of Surveys constructed 10.25 miles of main, and 80.29 miles of branch, sewers. Not only have we built during the past three years nearly 16 per cent. of all the main sewers, and over 26 per cent. of all the branch sewers constructed since the building of the first sewer, but it is undeniable that with the practical business methods in force, the material and work now being put into sewers are of a character to justify the belief that they will not break as frequently as those heretofore constructed.

The Intercepting sewer, built for the purpose of carrying below the Fairmount Dam the sewage that formerly flowed into the Schuylkill river and mixed with the drinking water of the city, is accomplishing the work for which it is intended. Already twenty-nine factories, giving employment to 10,000 persons, and 328 other buildings have been connected, and nearly all the parties notified have taken out permits.

Five new bridges were begun during the past year, one of which was the much needed structure across the Schuylkill

river on the line of Walnut street. Four bridges were finished, three were authorized, and two more were planned.

Three years ago the storage capacity of our reservoirs was 195,000,000 gallons of water, equal only to two days supply; on the first of January last, this capacity had been increased to nearly 900,000,000 gallons, nearly eight days supply—a very satisfactory increase.

The clearness and purity of the water now distributed to a very large portion of our city proves conclusively the correctness of the policy of subsidence, and the work of building storage reservoirs should be continued until their capacity is at least doubled.

The most pressing needs of the Bureau of Water are four large reservoirs, larger distributing mains in many sections of the city for the purpose of supplying the older portions with subsided water and of giving water to the thousands of new buildings annually erected, and new pumping engines at several of the stations.

Having had interviews with many scientific men of our country respecting a purer supply of water for our city, and having given this important subject much consideration, I have reached the conclusion that any attempt at filtration upon a scale large enough to purify by that method the enormous quantity of water used is at present impracticable, and the condition of our finances for many years to come will not warrant the adoption of any of the many proposed schemes of bringing our water supply from the Delaware river, the Perkiomen, or from Lake Erie, or of any extended filtration, and all that can be done at present for a supply of purer water consists in the immediate increase of our subsiding and distributing capacity.

When in the future the water we use is brought from other sources than our present supply, it will be necessary to have storage basins, and those now constructed will be required in connection with any plan that may be hereafter adopted, and as the purification of the water by subsidence is rapid and cer-

Bureau of Highways.

The report of the Chief of this Bureau shows in detail the great extent and variety of the work done on the highways and upon the bridges of the city during the past year. The actual expenditures of the year were but $171,784.60 greater than in 1888, but the amount of work done, both new and in the way of repairs, is very much greater than these figures would indicate.

The extent of streets repaved, or newly paved with improved pavement, is 42 miles 1788.5 feet. About two-thirds of this work is first paving. In 1888 it was 28 miles 4377.11 feet, and in 1887 it was 10 miles 1039.13 feet.

The grading of streets required the handling of 323,076 cubic yards of earth, fifty per cent. more than in the previous year. 46,069 square yards of new sidewalks were laid. All this shows the rapid growth of our city, and the consequent opening of new streets.

The figures relating to the general repairs and maintenance of our highways are equally instructive, and give gratifying evidence of active work, resulting in much needed improvement of the streets. Very much more money must be expended, however, before we shall be able to boast of well paved and well kept thoroughfares in all parts of our city.

The following tables give comparative statements, in detail, of the work done during 1887, 1888 and 1889, of the paving of new streets, of the repaving of old streets, and of the receipts and expenditures of the Bureau of Highways.

Comparative Statement of Work Done.

	1887.	1888.	1889.	
New paving	45,170.13	150,750.13	192,965.5	Linear feet.
Macadamizing (new)	8,669.00	1,466.98	30,583.00	" "
Grading	139,450.00	213,476.71	323,076.00	Cubic yards
New footway paving		28,166.8	46,069.00	Square yards.
Repairs to paved streets	585,703.13	573,718.64	606,786.00	" "
Footways repaved	3,557.42	7,978.91	15,756.96	" "
Ditches repaved	9,120.00	26,234.00	32,258.00	
Gutter stone laid	11,860.00	15,295.00	11,175.00	Linear feet.
Crossing stone laid	20,919.78	36,583.00	40,043.00	" "
Tramway stone laid	2,880.56	106.00	97.00	" "
Curbstone reset	7,501.00	162,798.00	283,809.00	" "
Wooden trunks	1,981.00	4,337.5	5,555.00	" "
Brick and stone drains	578.5	467.00	883.05	" "
Gutters paved	7,809.00	750.00	696.00	" "
Hand railings		1,193.00	2,776.00	" "
Broken stone used	8,114.64	11,649.04	23,954.14	Cubic yards.
Macadamizing (resurfaced)		19,083.02	55,797.00	Linear feet.
Footway, curb, and railroad notices served	5,057.00	9,124.00	14,073.00	
Block gutters		1,466.98		" "

Summary of work done in Improved Pavements. New streets.

	1887.		1888.		1889.	
	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks.	54,398.08	18,633.00	196,232.23	65,852.61	163,022.30	57,609.00
Sheet asphalt			16,431.28	5,511.76	15,577.36	5,077.00
Vitrified brick.	8,041.00	2,881.00	75,601.00	22,542.00	88,793.48	26,986.00
Asphalt blocks.	1,587.00	1,054.00	34,464.00	16,629.00	42,779.00	24,653.00
Macadamizing	22,666.00	8,669.00	4,229.96	1,466.98	58,856.00	30,583.00
Slag blocks					2,146.00	938.00
Total	86,692.08	*31,287.00	326,958.47	†112,002.35	371,174.14	‡144,846.00

Replacing Cobblestone with Improved Pavements. Old streets.

	1887.		1888.		1889.	
	Square yards.	Linear feet.	Square yards.	Linear feet.	Square yards.	Linear feet.
Granite blocks.	29,396.86	10,536.00	65,780.85	24,689.36	127,531.37	56,873.00
Sheet asphalt	33,813.72	10,971.83	44,354.99	13,365.40	81,848.99	21,729.5
Vitrified brick.	4,000.00	1,044.30	8,274.6	2,160.00		
Total	67,210.58	*22,552.13	118,410.44	†40,214.76	209,380.36	‡78,602.5

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

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

‡ 1889. Total amount of new paving 223,548.5 linear feet, equal to 42 miles, 1,788.5 linear feet.

Comparative Statement of Receipts.

Year.	Receipts.	Increase.
1887	$56,472 82	
1888	58,544 93	$2,072 11
1889	70,203 53	11,658 60

Comparative Statement of Expenditures.

	1887.	1888.	1889.
Current Expenses	* $611,725 13	$557,695 71	$577,299 26
For Extensions	399,336 81	537,744 91	690,063 69
Total	$1,011,061 94	$895,440 62	$1,267,353 95

* For street cleaning, $314,672.69.

The Superintendent of Bridges reports general repairs to 42 of the 231 bridges belonging to the city, at a cost of $26,823.49, and estimates that similar work during next year will cost about $30,000. He also repeats the recommendation for rebuilding the bridge over the Philadelphia and Reading Railroad on the line of Girard avenue, near Thirtieth street, which is and has been for some years past in a hazardous condition, being now supported on trestles erected by the Railroad Company. To rebuild this bridge with plate girders and buckle plates at its present length would cost about $16,000; to rebuild it to accommodate additional tracks needed for the railroad would increase this sum to $60,000. Early action by Councils in this matter is of the utmost importance.

The License Clerk reports that the collections, by the Receiver of Taxes, for licenses issued by him, amounted to $70,203.53, 20 per cent. more than in 1888, and 42 per cent. more than the average since 1876.

Of the amount appropriated for repaving with improved pavement streets occupied by Passenger Railway Companies, $196,106.80 was expended in paving with Belgian blocks 6⅔ miles of streets, and the bills for the work have been sent to the City Solicitor for collection.

The streets repaved are reported in detail by the Chief of the Bureau; they are all in the business part of the city, and were selected, first, because of their bad condition; second, with a view to secure continuous stretches of good pavement by repaving adjoining and contiguous streets; and lastly to

make a distribution of the cost of the work amongst the several companies, based upon mileage of road, so that the legal question involved would affect all companies alike, and that the repayment of the sums expended would not become a hardship financially upon any one corporation.

The appearance of the streets repaved, their increased adaptability for heavy traffic, their greater comfort to those using them, whether in vehicles or as pedestrians, and the facility with which the new pavement is kept clean, speak volumes in advocacy of the continuance of this work, and with the appropriation for 1890, equally satisfactory results should be reached.

It is, of course, impossible to predict the outcome of the suits brought to recover for the city the amount expended during the past year, or the possible time when final decisions will be reached. As they affect not only the liability of the companies for the large sums already expended, but also their still greater liability to repave with improved pavement all the streets occupied by their tracks, the claim of the city will be strongly contested, and only the decision of the Supreme Court will be a final settlement of this vexed question.

If this decision is in favor of the city's claim, the companies will repay the money, which can be again used for highway work, and if adverse to the city, the city's money will have been expended for much needed work for which the city was liable; and during all this time of legal contention, the streets repaved are a comfort to the people using them, and an evidence of civilized government and not the disgrace they were in their ancient cobble stone condition.

Under the appropriation for replacing, with an improved pavement, the cobble-stones on streets not occupied by passenger railway tracks, $2\frac{47}{52}$ miles were paved with Belgian blocks and $3\frac{4}{7}$ miles with sheet asphalt; total, $6\frac{3}{5}$ miles at a cost of $285,442.61. The streets repaved are reported in detail by the Chief of the Bureau. The work was done on streets designated by Ordinance of Councils, which was prepared by

the Committee on Highways after conference with the Department for the purpose of selecting the streets, with a view to more continuous work and to remedy the difficulties incident to the manner in which work of this character had theretofore been ordered. The results are satisfactory and have been greatly commended by citizens as well as by city officials.

The paving and repaving of streets with sheet asphalt has had much consideration, officially and otherwise, during the past year, and Councils should consider whether it would not be wise, as well as profitable, for Philadelphia to avail herself of the experience of cities having done more paving of this character. This would no doubt result in a modification of the regulations established for this class of work by the ordinance passed in 1885, since which time great changes and improvements have been made in this class of work.

In addition to the large increase of work, because of the very liberal appropriation for maintenance and for new work in 1889, the operations of private corporations of all kinds in building structures of all sorts and for all sorts of purposes, under and upon our highways, have added to the labors and anxiety of the officers of this Bureau.

It sometimes seemed as if it were a matter of deliberation to wait for the final completion of a piece of new pavement, and then to make application for some sort of underground structure or connection, and much ill feeling has been engendered by the very positive and very proper refusal of such permits except in cases of serious emergency.

It is a rule of the Department that notice be served upon all owners or occupiers of property interested, to make all necessary connections with sewers, pipes and conduits before any new paving is commenced, and if it is a hardship to do without such connections, except at the expense of the condition of a newly paved street, the sufferers need blame only themselves.

The washout of roads and streets and the breaking of sewers by the frequent and unprecedentedly heavy rainfalls of the

past year, caused much labor and expense to the Bureau of Highways. It was practically impossible to keep the country roads in even passable condition of repair, whilst the damage done and threatened by the sewer breaks caused serious alarm.

The repairs to what is known as the "Cohocksink" sewer had been commenced at Germantown avenue and Second street, and at Thompson and Third streets by the Bureau of Surveys when the floods began, and the work done there will be reported upon by that Bureau. The repairs of the breaks elsewhere were made by the Bureau of Highways.

It had been impossible, except in the First and Fifth Highway Districts, to make annual contracts for sewer repairs unless at prices deemed excessive, and when the general breaks came it was necessary to make the repairs by days' work.

The most serious of these breaks were in the sewer on Parrish street between Twenty-fifth and Twenty-seventh streets, on Twenty-seventh street from Parrish street to Brown street, and on Brown street from Twenty-seventh street to Twenty-eighth street. This sewer, known as the "Brown street extension of the Pennsylvania avenue sewer," was built many years ago, mostly on the surface and in made ground. It was not covered for many years and was finally buried by dumpage of dirt from 25 to 30 feet deep. Because of the extension of streets and the consequent construction of branch sewers it was taxed greatly beyond its capacity, and when the floods came the breaks came also.

The work of repairs was greatly hindered by repeated rainfalls and by consequent new breaks, and it was only by establishing a "pumping station" at Parrish and Twenty-seventh streets, and by running day and night, for several weeks, three pumps with a capacity of 6,000 gallons per minute, which kept the broken portions of the sewer nearly free from water, that it was finally possible to complete the rebuilding of the broken work. The water pumped flowed down Parrish street and Twenty-eighth street, to Brown street and Pennsylvania avenue, into the sewer on the latter street.

The officers of the Bureau of Water rendered invaluable service in the work of repairs.

The total cost of this work was $53,000.

The Bureau of Surveys is now building a new sewer on Twenty-fifth street, from Parrish street to Pennsylvania avenue, which will it is believed, make a similar disaster impossible.

To secure early and frequent knowledge of the condition of our sewers, plans have been perfected for their systematic inspection under the supervision of the Inspector of Sewer Repairs. These plans contemplate the thorough interior examination of all sewers over three feet in diameter at least once in three months, and it is believed that this will lead to the discovery and prompt repair of weak and dangerous places, and result in the saving of much money to the city.

The question of the kind of pavement best adapted for the highways of a city like ours, which has within its 129 square miles of territory streets used for the heaviest business traffic, thoroughfares which should be adapted to driving for pleasure in light carriages, and roads used only for farm purposes, is one of serious concern.

Under the laws governing this matter the first cost only can be charged against the property abutting on the streets to be paved, and the future maintenance of these streets must be defrayed out of general taxation. As a result, the average property owner is always anxious for a first pavement that costs little, because he must pay for it, not caring for the fact that cheap pavements soon wear out and become a source of endless annoyance and expense. When repairs or repaving become necessary, the same average property owner will be satisfied with nothing less than the best, no matter at what price, and whilst doing both these things he imagines that his course is one of good financiering, when, in fact, the first saving causes increased expense to all tax-payers, himself included, in the form of continued, but always unsatisfactory, repairs.

The question becomes still more complicated because of the decisions of the Supreme Court, that no charge for paving of streets can be made against properties in those portions of the city not assessed for taxation at "full city rates," and as a result, in many portions of the city, people have all the advantages of city conveniences and improvements except paved streets, and not these latter, only because they cannot be compelled under the law to pay for them, for the reason that they pay one-third or one-half less taxes than other properties; and then, of course, they complain of the wretched condition of their streets for which they only are responsible. Surely some remedy for this anomalous condition of affairs should be found.

In view of all this, and because of the persistent pressure, on the part of the property owners, for a street pavement that does not cost them much, and of the continued introduction of all sorts of materials which experience elsewhere, or common judgment anywhere, has condemned, or should condemn, as unfit for the making of good and durable roads, would it not be well for Councils to consider, in their many ordinances directing the paving and repaving of streets, the question whether, in a few years, our streets will not be in the same deplorable condition as now, notwithstanding the large amounts of money spent, for what inventors and manufacturers of paving material are pleased to call "improved" pavements.

All writers upon this subject agree that a pavement of stone blocks, such as is known in our city as "Belgian" block pavement, laid upon a proper foundation and not disturbed, except as public travel may disturb it, is the best for the purposes of a large city.

During the past few years paving with sheet asphalt has been introduced, with satisfactory results in this country and abroad, and when such a pavement is laid upon a proper concrete or broken stone base, with the asphalt covering of good quality well laid, it furnishes a surface adapted to light driving, easily kept clean and which does not rapidly wear out.

The pavement next most popular in our city is of a material called "vitrified brick" which, we are told, shows great wearing qualities in cities in the west. The Chief of the Bureau of Highways reports that "the first pavement of this material was put down in this city in 1887, and already shows signs of wear that does not give much promise of its lasting qualities." This report, unfortunately for this class of pavement, is founded upon fact.

What is generally known as "asphalt" blocks, composed of a mixture of bituminous materials such as tar and pitch, and sand and gravel, pressed by heavy machinery into bricks about twice the size of the ordinary brick, was formerly largely used in paving our streets, and it continues to be used to some extent under what is called "contracts for paving private streets" by the owners of properties fronting upon said streets. The results have been uniformly so unsatisfactory that the use of this pavement should be prohibited.

Macadam, or Telford pavement should be laid only in the country districts, and not where it is expected to be the permanent pavement. It is always muddy in wet weather, and dusty in dry weather, and, unless it is regularly and carefully sprinkled and rolled, it wears out more rapidly than any other kind of pavement.

"Slag" blocks, which are made of the refuse of iron furnaces, run in its fluid state into brick moulds, and with which 2,146 square yards of pavement were laid last year, have not been in use long enough to test their wearing qualities. Their condition after even the short time in which they have been used, does not give promise of durability.

The different kinds of pavement, considering all the purposes for which pavements are laid in populous business communities, in connection with their first cost and subsequent expense for maintenance, should be classified as follows:

First, "Belgian" block of good granite.
Second, Sheet asphalt.
Third, "Vitrified brick."

Fourth, "Asphalt" blocks.

Fifth, Macadam or Telford.

Not sufficiently tested: "Slag" block.

No pavements of classes 4 and 5 should be laid in our city at all, and of class 3 only where it is certain that little driving will be done over the streets so paved, and then the joints in the paving should be filled with pitch or paving cement.

Board of Highway Supervisors.

The transactions of this Board and of its employees are fully set out in the reports of the secretary and of the chief draughtsman.

The increased receipts and the number of permits authorized issued show the continued disturbance of our highways, and the outlook for a cessation of such work at an early date is very unpromising.

Underground companies are being organized and are asking Councils for privileges which will, if granted, continue indefinitely the tearing up of street pavements and the interference with the transaction of business by the general public.

In addition to the money expended by the city to make good the damage done, these private companies come into direct competition with the interests of the city in the consumption of gas, and some sufficient return should be exacted for the valuable privileges granted them.

The following is a statement of the number of permits authorized to be issued to the several underground companies during the year 1889:

Penn Electric Light Company	22
Edison Electric Light Company	2
Frankford Avenue Merchants' Electric Light Company	15
Front Street Merchants' Electric Light Company	13
American Telegraph and Telephone Company	19
Bell Telephone Company	36
Total	107

Why should not the companies which have received or shall hereafter receive the right to occupy the city's streets with their wires, whether overhead or underground, be required to light these streets free of cost? If the company furnishes arc lights, one such light should be maintained at each street intersection, and additional lights at distances not more than 200 feet apart; and if incandescent lights are furnished, a light of not less than twenty candle power should be placed in every lamp-post erected. If the company only owns the conduits and rents them to companies furnishing power for lights, these latter companies should furnish the lights.

At present the city receives no adequate return for the opportunities afforded these corporations to make profits at the expense and to the injury of the city's property.

The recommendation of the executive officers of the Board for an increase in the staff of draughtsmen is worthy of favorable consideration. The year's receipts for work done for parties desiring plans for structures to be built under permission of the Board exceed the expenditures by $987, very nearly double the profits for the year 1888.

The plans made of underground works, especially in the older portions of our city, are extremely valuable. When pipes were laid and sewers built many years ago the importance of records of the work done was not realized as it is at the present time, and the important information now being gathered should be plotted as rapidly as it is secured.

The appropriation already made is insufficient to employ additional help, and the expenditure of the present income in the employment of competent assistants should be authorized.

The following is a summary of the transactions of the Board, of the labors of the draughting department and of the receipts and expenditures for the years 1887, 1888 and 1889:

Transactions of the Board of Highway Supervisors.

	1887.	1888.	1889.
Permits authorized to be issued for vaults	8	8	9
Permits authorized to be issued for railroad tracks, curves and turnouts	27	10	51
Permits authorized to be issued for underground pipes	2	3	7
Permits authorized to be issued for electrical conduits	46	108	107

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

	1887.	1888.	1889.
Street record plans corrected	32	38	82
New street record plans prepared	49	65	39
Blue print plans placed on file	90	110	190

Receipts and Expenditures.

	*1887.	1888.	1889.
Receipts		$2,811 00	$3,857 00
Expenditures		2,349 89	2,920 00
Profit to the city		$461 11	$937 00

* No receipts in 1887. Remunerative work not done until 1888.

Bureau of Street Cleaning.

This Bureau continued during 1889 the good work so satisfactorily done in the previous year. The streets are cleaner than they have been for many years past, and the garbage and other offal have been removed promptly. The number of complaints for the non-removal of garbage was 3,237 for nine months in 1887, 1,162 in 1888, and 763 in 1889. The total complaints, of all kinds, has been reduced from 4,539 in 1887, and 3,395 in 1888, to 1,937 in 1889; a gratifying improvement attributable partly to the prompt enforcements of the penalties named in the contracts, but still more to a conscientious endeavor for honest service by the contractors, who, with a single exception, and that exception relating only to the non-collection of garbage, did their work well.

The very large amount of repaving of streets with improved pavement, the laying of gas and water pipes, the building of sewers, and the construction of conduits for telegraph, telephone, and electric wires, together with the erection of nearly 12,000 new buildings, has rendered the work of keeping the streets clean more difficult than usual.

The expenditures for salaries remain as during the preceding year, whilst the actual expenditures for cleaning, etc., was $422,147.00—$10,169.58 less than during the year 1888, notwithstanding the fact that the territory within which the streets should be cleaned at least daily was largely increased.

The number of squares cleaned has increased from 320,455 in 1888, to 473,829 in 1889, but the number of loads of dirt and offal of all kinds removed has decreased from 894,861 in 1888, to 729,796 in 1889, the result of the many heavy rains which reduced the labors of the street cleaners to the extent noted.

The number of crossings cleaned has decreased from 205,043 in 1888, to 27,161 in 1889, because of the absence of snow and ice during the winter of 1888–89.

The total Work done during the Year 1889, is as follows:

DISTRICTS.	CLEANED.					REMOVED.				Number of Complaints of all Kinds.
	Squares	Inlets.	Crossings.	Market Houses.	Snow from Fire Plugs.	No. of Dead Animals.	NUMBER OF LOADS.			
							Dirt.	Ashes.	Garbage.	
First	92,295	30,377	5,591	537	.....	932	52,713	72,088	8,222	137
Second	96,325	43,547	7,372	553	386	1,930	35,748	68,327	8,280	488
Third	73,083	45,170	2,297	1,381	.....	1,717	31,436	72,810	11,863	313
Fourth	153,165	41,746	4,526	.....	.....	6,404	109,541	154,457	19,761	452
Fifth	58,961	19,924	7,375	.....	.....	410	27,134	45,954	11,467	547
Total	473,829	180,764	27,161	2,471	386	11,393	256,572	413,631	59,593	1,937
Total, 1888	320,455	195,132	205,043	2,218	2,598	16,355	306,722	499,479	88,660	3,395

The following is a comparative summary of the expenditures for street cleaning for the years 1887, 1888, and 1889.

Years.	Amount.	Decrease.	Increase.
1887	$804,021 00		
1888	441,514 50		$137,493 50
1889	434,067 00	$7,447 50	
1890 (appropriation)	$444,137 00		

The specifications for 1890 have been modified and improved as was deemed wise by the experience gained by the past year's work; the territory to be cleaned at least daily has again been increased; more frequent cleaning of portions of the city not so cleaned is prescribed, and all contracts provide that this work shall be done by machinery.

The required removals of garbage have been increased, and the Department has reason to expect that the Bureau will render satisfactory service to the public during the year 1890.

The appropriations for the ensuing year are:

For salaries	$11,920 00
For cleaning, etc	432,217 00
Total	$444,137 00

Tabular statements of work done in 1889, and the specifications under which the work is to be done during 1890, are printed with the report of the Chief of the Bureau.

Bureau of Surveys.

This Bureau built more lineal feet of branch and of main sewers during the year 1889 than in any previous year, and the sum of money expended for the work by the city, and by the property owners through assessment bills, was greater than

in any one year, except for branch sewers in 1888, and for main sewers in 1876. The following is a summary of the work:

Years.	Branch Sewers.		Main Sewers.	
	Feet.	Cost.	Feet.	Cost.
1876	43,560	$109,336 99	9,714	$491,365 94
1887	161,999	255,674 01	13,750	235,753 16
1888	159,890	498,553 95	14,705	215,920 42
1889	162,037	432,414 91	25,640	348,206 49

Years.	Branch Sewers.		Main Sewers.	
	Miles.	Cost.	Miles.	Cost.
Total sewers built to 1890.....	301.31	$3,755,163 67	66.59	$4,301,371 50
Built in 1887, 1888, and 1889...	80.29	1,186,642 87	10.25	799,880 01

or over 26 per cent. of all the branch sewers, and nearly 16 per cent. of all the main sewers in the city.

Work of greater or less extent, as the appropriation made by Councils for the purpose permitted, was done upon the following main sewers, but only the sewer on Lombard street, from Ninth street to Thirteenth street and on Thirteenth street to South street, was finished to the full extent of the work needed and planned.

List of Sewers on which Work was done during the Year 1889.

Allegheny avenue, from Seventeenth street to west of Twenty-third street.

Bainbridge street, west to Port Warden's line on the Schuylkill river.

Bridge street, from east of Pennsylvania Railroad west to Torresdale avenue.

Clearfield street, from Ninth street west to the Connecting Railroad.

Gunner's Run, northwest from D and Rosehill streets.

Lombard street, from Ninth street to Thirteenth street; and on Thirteenth street, from Lombard street to South street.

Reed street, from the Schuylkill River East Side Railroad east to Patton street.

Somerset street, from the foot of Williams street, through the Richmond coal wharves, west to Spring street.

Seventeenth street, from Clearfield street to Allegheny avenue.

Tasker street, from the River Delaware to Front street.

Tasker street, from Front street to west of Fifth street.

Twenty-fourth street, north from Clarence to above Lehigh avenue.

Twenty-fifth street, from Pennsylvania avenue to Parrish street.

Washington street, in the Twenty-third Ward.

Wingohocking sewer, in the Twenty-second Ward.

All of these, and many others not yet begun, are of vital importance to the health and cleanliness of our city, and large appropriations are desirable for their immediate extension and speedy completion.

In addition to completing the contracts for work on the above sewers, the following contracts, all of them for the extension of main sewers heretofore partly built, except the one on Norris street and on Susquehanna avenue, are authorized and some of them executed. Work under many of them is begun, and it is expected that all will be finished during the year 1890:

Clearfield street, from Thirteenth street east to the Connecting Railroad.

Norris street, from Ninth street east to Susquehanna avenue (three contracts).

East Susquehanna avenue, from East Norris street to the Delaware river (two contracts).

Somerset street, from Spring street west to the Aramingo canal.

Wingohocking sewer, eastward from Penn street, Twenty-second Ward.

Extensions of the connections of the intercepting sewer, in the Twenty-first Ward.

The above exhaust the appropriation made for this class of work, and the many other pressing demands for main sewers elsewhere must be held in abeyance until additional funds are placed at our disposal.

The early passage of the ordinance authorizing the expenditure of the amount set apart in the annual appropriation for main sewers, enabled this Bureau to begin operations in the spring, and most of the work was done during that season of the year in which the weather was favorable for operations of this kind. The work authorized for 1890 is in still greater state of advancement, the distribution of the money having been made in the appropriation ordinance itself.

The building of connections with the Intercepting sewer is being steadily pushed; the amount appropriated and expended during 1889 being $25,000.

The advantages of this work are becoming more and more apparent, no less than 29 mills, with over 10,000 employés, and 328 other buildings having already made connections with this sewer, as required by law. 629 original notices to make connections have been served, and permits have been taken out by nearly all the parties notified.

The arrest of two men dumping refuse into the river from one of the mills, and of the owner of 27 dwelling houses in the lower part of the Twenty-first Ward, who failed to make connections with the sewer when notified to do so, and the expressed determination to press for the conviction of these and of all others similarly offending, has satisfied the owners of property on the line of the sewer that violations of law in this respect will be no longer tolerated, and as a result

plumbers and bricklayers have been kept busy making the connections ordered.

One hundred and ninety-eight connections were made with the intercepting sewer and 5,075 with other sewers during the year 1889.

Many specific complaints of drainage running over footways into gutters and thence to the nearest inlet, creating nuisances in winter by the accumulation of ice, and in summer by foul stenches, have been made to the Department, and a great many charges of neglect of duty on the part of the officers of the Bureau of Surveys have been made because these nuisances were not abated.

Under the ordinances governing this matter, these officers can only report on the necessity for carrying this waste and foul water by underground drains into the public sewers, but they cannot compel such connections except after the approval of their reports by the Committee on Surveys of City Councils. The details of the present ordinance cause so much delay that it is respectfully suggested that it be amended and the responsibility for the work be placed where it properly belongs.

During the year 297 "gutter" complaints were received and disposed of as follows:

Connections made	103
Sent to the City Solicitor for prosecution	24
Dismissed	11
Held	2
Pending	157
Total	297

The work upon new bridges has been as follows:

Finished	4
Begun	5
Authorized	3
Planned	2

Those finished were:

One on Lansdowne avenue over Cobb's creek.

One on Chester avenue across the West Chester Railroad.

One across Sixth street on the line of the Connecting Railroad (all referred to in the report for 1888), and

One across Willow avenue on the line of the Chestnut Hill branch of the Philadelphia and Reading Railroad, in the Twenty-second Ward.

Those begun were:

Three on the line of the Connecting Railroad, across K street, Kensington avenue and Frankford avenue, all of them structures of great importance to the safety of travellers upon both the railroad and upon the streets crossed. They will be finished early in the spring and will cost the city $85,750. The cost to the railroad company, which is responsible for the completion of the work, for actual construction of bridges and for the consequent changes of grade of tracks and streets, will very largely exceed this sum.

One on Poplar street, across the main line of the Philadelphia and Reading Railroad Company, is being built by the Union Passenger Railway Company to enable its cars to enter Fairmount Park at that point, as well as for general travel, and

One across the River Schuylkill on the line of Walnut street.

Work on this long-discussed and much-desired structure has been begun under plans approved by Councils and with sufficient appropriation to construct the necessary piers.

The river piers, two in the river making three spans, the one in the center 100 feet wide and the two on the east and west of somewhat less width, all of them giving clear passage for navigation of twenty-one feet at mean high tide in their center, and one each on the east and west shores of the river, are under contract to be completed by September next at a cost of $120,000.

The trestle piers on the line of Walnut street, 111 in number, are under contract to be completed on April 2, 1890, for the sum of $55,000.

The superstructure will be of iron, and the bridge and approaches will be 3,215 feet long, extending from sixty feet east of Twenty-third street to about 140 feet east of Thirty-third street, and the estimated cost of the whole structure is $900,000.

No appropriation except for the construction of the piers has been made.

The report of the Chief Engineer and Surveyor gives detailed and interesting descriptions of the work planned, and of its progress under the contracts already made.

Those authorized to be built are:

One on Second street across the Richmond branch of the Philadelphia and Reading Railroad.

One across Twenty-second street on the line of the Connecting Railroad, and

One on Thirty-fourth street across the many tracks of the Pennsylvania Railroad.

When this latter structure is completed the undergrade crossing at Thirty-fifth street will be abandoned, and the railroad company will be able to make important changes in the, at present, very dangerous arrangement of tracks and crossovers at this point.

The cost of these bridges will be largely in excess of the amounts appropriated by Councils for their construction, but the Pennsylvania Railroad Company has already contracted with the city for the erection of those at Twenty-second street and at Thirty-fourth street, and it is expected that the Philadelphia and Reading Railroad Company will do likewise for the one on the line of Second street.

Those planned are:

One for the cable cars on Columbia avenue near Ninth street, across the tracks of the Philadelphia, Germantown and Norristown Branch of the Philadelphia and Reading Railroad.

One on the line of the Connecting Railroad at Broad street. The latter is to be a stone structure of four arches, and its erection will add greatly to the appearance of the street and the safety of the crossing. The proposed plans contemplate more headway than is given by the present bridge, and also some important changes of the grades of adjoining streets.

The following is a comparative statement of the operations of this Bureau in the active construction of the work during the years 1887, 1888 and 1889.

Summary of Bridges, Main, Branch, and Private Sewers, built during the years 1887, 1888, and 1889.

	1887.		1888.		1889.	
	No.	Linear feet.	No.	Linear feet.	No.	Linear feet.
Bridges	9		2		4	
Intercepting sewer (section)	2		1			
Intercepting sewer connections					5	
Wissahickon Valley sewer (section)	2	17,213.62	2	13,719.28	2	25,640.53
Storm water conduit, Falls Village	1					
Main Sewers	6		16		15	
Branch sewers	130	84,709.00	250	149,765.83	254	151,732.00
Private sewers	63	17,290.00	40	10,124.00	51	10,285.00
Total	204	*119,212.62	309	†173,609.11	327	‡187,677.53

* 1887, equal to 22.578 miles. † 1888, equal to 32.879 miles. ‡ 1889, equal to 35.544 miles.

Much of the time the officers of this Bureau, during the latter portion of the year, was taken up in the work of sewer repairs, or rather of sewer reconstruction.

Under the item of appropriation "for the examination and reconstruction of old sewers," contracts had been made for work on the sewer on Willow street, at St. John street and at Eighth street, and for the "Cohocksink" sewer on

Germantown avenue near Second street, and on Thompson street near Third street, with the intention of continuing the work on other portions of these sewers if the amount appropriated would permit.

Work was progressing satisfactorily when the heavy rainfalls, for which the year 1889 will be noted in history, came, destroying the new and literally tearing the old work to pieces, justifying the several reports of the condition of these sewers made to Councils.

The work of repairs was prosecuted with all the despatch possible under such adverse circumstances. It was practically a building of a new sewer on Germantown avenue, from Van Horn street to west of Second street, on Thompson street from east of Third street to Charlotte street, and on Willow street from St. John street to Second street, and on Willow street for several hundred feet east and west of Eighth street.

This work cost over $75,000, and a large portion of the sum is still unpaid, awaiting an appropriation by Councils for its settlement.

A contract for continuing the repairs on the Cohocksink sewer has been made and work resumed on Thompson street, west of Charlotte street.

The permanent remedy for all these difficulties was named in last year's report: "The building of other main sewers on lines parallel with those already built," so that the old structures might be relieved from the great flow of waters for which they were not originally planned.

This remedy is now being applied for the relief of the "Cohocksink" sewer, by the construction of a large sewer beginning at the foot of Susquehanna avenue (Otis street), thence on Susquehanna avenue to East Norris street, and on Norris street to Ninth street, tapping the old sewer at the latter point. This work is under contract to be finished in 1890 at a cost of $305,000. It will be a relief to the entire drainage system of the north-eastern part of the city, and in addition to this, will be a great benefit to the people of the old

Kensington and the adjoining districts, by compelling the abandonment of the Kensington Pumping Station of the Bureau of Water.

The building of the large twin sewer through the Richmond coal wharves, from the foot of William street and thence west on Somerset street to Spring street, is rapidly approaching completion. The extension of this sewer to the Aramingo Canal, and to a junction with a sewer built from the west to that point many years ago, will give to the people living in this portion of our city a partial relief from the dangers and nuisances resulting from the present insufficient drainage.

The condition of this whole territory, known as the Aramingo Canal District, demands large and immediate expenditures for the construction of other main sewers emptying direct into the Delaware river, so that the open ditch, dignified with the name of "canal," may be filled up and obliterated, thus removing an ever-present menace to public health and a barrier to public improvement. The sewer on Westmoreland street, at present discharging its foul contents into the open air west of Frankford avenue, should have early attention.

The construction of these sewers would also permit a physical change of grades planned for the improvement of the low lands of this vicinity.

The work of the Registry Bureau, attached to the Bureau of Surveys, has largely increased during the past year, as shown by the following summary of its operations:

	1887.	1888.	1889.
Number of certificates registered owners issued	11,175	10,375	8,158
Number issued for use of the law department	400	209	337
Receipts from certificates of registered owners	$2,803.25	$2,617.00	$2,039.50
Number of original lots plotted	9,039	8,503	11,868
Number of transfers registered	19,774	19,564	21 370
Number of plans made for use of city departments, bureaus, etc		57	157
Number of examinations of registry plan books made by the public		18,717	19,547
Number of descriptions of property filed for registry	21,944	18,717	22,034
Number of titles perfected	1,512	1,665	2,091
Number of certificates of legal opening of streets, issued to bureaus, etc	879	2,739	3,465
Number of certificates of registered owners in municipal lien cases for law department	526	412	1,383

The Chief Engineer and Surveyor refers fully to these matters, and it is merely necessary to name here, the completion of the records of the legal opening of streets from the year 1695 to date, covering 6,218 entries, and making two large volumes of important information, heretofore obtainable only by long searching of the records of the Court of Quarter Sessions.

The completion of the Index of streets opened, is a work of great advantage to those interested in the transfer of real estate and in building operations.

Reference is also made to the fact that Land Title Companies reduce the receipts of this branch of the Bureau of Surveys, by issuing "certificates of registered owners," making the city's record the basis of their certificates.

The Board of Surveyors is gradually coming under the immediate control of this Department by the appointment of the District Surveyors composing this body, as the terms of those elected by the people expire, or as those elected die or resign.

The First, Fourth, Eighth, Eleventh, and Thirteenth Districts have already been so filled, and the Second, Third, and Sixth Districts will be on April 1st, next. The remaining five

districts will not become vacant by expiration of term of service by election, until April 1, 1891.

The financial results of these changes are of advantage to the city, the fees received and earned in the districts already affected (four during the whole year and one during four months of 1889), exceeding the salaries and expenses, $14,639.07.

The following statements show the receipts and expenditures by districts for 1889, and also, comparatively, for the years 1887, 1888, and 1889:

	1887.	1888.	1889.
The total receipts of the districts working under the new law were	* $5,229 46	† $32,350 99	‡ $48,480 04
The total expenses were	4,290 00	21,504 74	33,840 97
Profit to the city	$939 46	$10,846 25	$14,639 07

* 1887. 1 District. † 1888. 4 Districts. ‡ 1889. 5 Districts.

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

District.	Surveyor.	Cash Receipts.	Credit for work done for the City.	Total Credit.	Expenses.				Balance Profit to the City.	Receipts in 1888.	Increase.
					Salary.	Pay of Assistants.	Miscellaneous.	Total.			
First.....	Thomas Daly.....	$9,710 19	$698 42	$10,408 61	$3,000 00	$1,856 52	$1,051 44	$5,907 96	$4,500 65	$3,521 96	$978 69
Fourth.....	Wm. W. Thayer...	635 58	105 00	740 58	491 66	339 98	77 85	909 49	*		
Eighth.....	C. A. Sundstrom..	4,817 44	2,216 31	7,033 75	3,000 00	2,624 75	1,216 80	6,841 55	192 20	.....	192 20
Eleventh.....	Joseph Johns n...	8,750 01	1,567 01	10,317 02	3,000 00	2,420 00	1,295 56	6,715 56	3,601 46	2,057 42	1,544 04
Thirteenth...	H. M. Fuller.....	18,147 22	1,832 80	19,989 08	3,000 00	7,129 51	3,336 90	13,466 41	6,518 67	5,266 87	1,246 80
		$42,060 44	$6,419 60	$48,480 04	$12,491 66	$14,370 76	$6,978 55	$33,840 97	$14,807 98	$10,846 25	$3,961 73
* Deficit in Fourth District, September to December, 1889.....									168 91	.....	168 91
									$14,639 07	.....	$3,792 82

The amount and the importance of the work of the Bureau of Surveys can be gathered from the report of the Chief Engineer and Surveyor, of which the foregoing is necessarily a brief extract.

The following comparative summaries of the receipts and expenditures for the years 1887, 1888 and 1889 show that the former have steadily increased, and that the increase in the latter is not so great as the increase in the work for which they were incurred:

Comparative Statement of Receipts.

Year.	Receipts of Bureau.	Receipts of District Surveyors.	Total.	Increase.
1887	$22,808 73	$4,891 46	$27,700 19	
1888	26,236 45	28,350 83	54,587 28	$26,887 09
1889	29,914 32	42,060 44	71,974 76	17,387 48

Comparative Statement of Expenditures.

	1887.	1888.	1889.
Current expenses	$63,704 05	$86,658 23	$132,289 61
For extensions	569,428 11	482,910 70	560,649 36
Total	$633,132 16	$569,568 93	$692,938 97

Bureau of Water.

In view of the continued agitation of the question of the city's water supply, it is difficult to make an abstract of the many interesting and important facts contained in the report of the Chief of that Bureau.

The points first to be considered are the totals of the work done, of the cost of doing the same and of the income derived by the city through the operation of this branch of her service.

All this is shown in the following comparative summary of the operations for the years 1887, 1888 and 1889:

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS,

FOR THE YEAR 1889.

BUREAU OF SURVEYS,

DEPARTMENT OF PUBLIC WORKS.

OFFICERS, 1889.

Chief Engineer and Surveyor,
SAMUEL L. SMEDLEY.

Principal Assistant—J. MILTON TITLOW.
Assistant—Gustavus K. Morehead.
Recording Clerk—Edward H. Thompson.
Sewer Registrar—William Calvert.
Sewer Clerk—William T. McPhail.

Draughtsmen:

George S. Connor,
Neville B. Craig,
Carl A. Trik,
Otto Reizler.

Stenographer and Type-Writer,
Joseph R. Scott,

Rodman,
Robert McFadden.

Janitor—Isaac Holland.

REGISTRY BUREAU.

Registrar,
JOHN W. FRAZIER.

Registry Clerk—James H. Roberts.

Draughtsmen:

Isaac E. Shallcross,
Charles H. Ott,
J. G. D. Craig,
William H. Wester,
S. Crawford Smith,
Hugo Trik,
O. S. Stallman,
Robert P. Green,
H. J. Humphrey.

Inspectors of Sewer Connections:

William S. Molineaux,
James H. Hendrickson.

Inspectors of Sewer Construction:

John Able, Jr.,
Newton B. Beam,
William Penn Brown,
Conrad F. Brown,
Theo. A. Brackney,
Joel P. Colebaugh,
James Duffy,
David J. Davis,
August Durr,
Geo. L. Deitz,
Samuel R. Franklin,
John P. Flood,
Joseph P. Hunter,
Thomas Hooper,
William L. Holbrook,
Alexander F. Harkness,
Titus Huber,
John Hare,
Edward C. Hill,
John Lindsay,
Chas. Y. Lauderbach,
William J. Little,
Chas. P. McCalley,
William May,
John G. Moore,
James McGill,
John McCormick,
George Moore,
F. D. Morris,
Henry Miller,
Chas. E. Preston,
Jas. V. Quigley,
Abraham Ruth,
David S. Rorer,
Jonathan G. Slater,
Henry M. Smith,
Emerick H. Sickels,
Champney R. Van Horn,
John Vicary,
George Willingmyre,
Joseph W. Williams,
Findley J. Watt,
Elmer E. Whiting,
John Wallace,
William Yetter.

Supervisor of Intercepting Sewer—Hiram L. Wynn.

ANNUAL REPORT

OF THE

BUREAU OF SURVEYS,

DEPARTMENT OF PUBLIC WORKS,

For the year 1889.

Philadelphia, January 1, 1890.

LOUIS WAGNER, ESQ.
Director of Department of Public Works.

DEAR SIR:—I have the honor of submitting herewith the Annual Report of work performed by the Bureau of Surveys during the year 1889, with accounts of receipts and expenditures, the construction of bridges and sewers, the plotting of streets, and other work done by the District Surveyors and Regulators, and the operations of the Registry Bureau and Sewer Permit Registrar.

The appropriations, expenses, transfers, balances, and receipts for the year, were as follows:

Appropriation for 1889		$774,332 00
Balance available from previous years		353,240 87
Additional appropriations and transfers		309,377 87
Amount of warrants drawn during 1889:		
Current expenses	$132,289 61	
For extensions	560,649 36	
Transfers from	70,686 08	
Balance available in 1890	664,583 67	
Amount merging	8,742 02	
	$1,436,950 74	$1,436,950 74

Number of warrants drawn, 1,920.

Total receipts, Bureau of Surveys and Registry Bureau	$29,914 32
Total receipts, District Surveyors	42,060 44
Total	$71,974 76

Engineering Bureau.

The Engineering Bureau has been busily engaged in the design and construction of 20 main sewers and 10 bridges, together with the usual routine work of estimates and sketches for preliminary estimates for Committees of Councils, and the preparation of contracts for all work done under the supervision of the Bureau, estimates for payments thereon, and for inspection. Extensive studies have been made for the revision of street grades in portions of the city but little above tide, and portions in the Twenty-fifth Ward confirmed, and will be continued the coming year in the First and Twenty-sixth Wards. Testimony has been furnished before the courts and examiners in a number of cases.

Walnut Street Bridge.

This bridge, which has been under discussion for many years, was authorized to be commenced by a partial appropriation of $200,000 made by Councils, December 24, 1888, and the design approved, except in elevation, through the property of the Allison Manufacturing Company, and the work directed to be commenced by Ordinance of March 22, 1889.

A contract was made June 7, 1889, with I. H. Hathaway & Co. for the four main river piers at a cost of $120,000. On account of the frequent mid-summer rain storms, preparatory work on the dams for river piers was not commenced until September 20 for the east river pier, and upon November 9 this work was carried away by a freshet in the Schuylkill river. Work was then begun for the dam of the west river pier on December 10. The dams are to be constructed under the direction and patents of J. E. Robinson, which have been successful in other places, but at this site there are greater difficulties to be overcome on account of the greater depth of water, it being 38 feet to rock, and overlaid with very little mud and cobble stones. Another contract was made June 19, 1889, with R. C. Ballinger & Company for all the trestle piers required between Twenty-fourth and Thirty-second

streets, at a cost not to exceed $55,000. On account of the great difficulties of obtaining stone from the quarries, work was not commenced until July 17, and it has been continually delayed for the same reason since. $14,842.93 has been paid on account of work done this year. The work has been under Inspectors L. M. Winston, George H. Paddock, and James Duffy.

All the foundations for trestle piers are upon piles between the Baltimore and Ohio Railroad tracks to near Thirty-first street, the original bed of the river having been, at some former time, that far west, and consequently filled with river mud to 45 feet below the surface.

The design shows three quadrangular truss spans over the river, 123 feet between centres of piers, the latter placed parallel with the river, two in the water, and two on either shore, giving a clear passage for navigation in the middle, at a mean high tide, 21 feet in height and 100 feet in width, with a similar opening on each side adjoining the wharves of somewhat less dimensions.

The approaches at either end of river spans between Twenty-fourth and Thirty-second streets will be wrought iron girder spans of 29 to 70 feet in length, supported by wrought iron columns, passing over Twenty-fourth street, Schuylkill River East Side Railroad, the Schuylkill Front and West Chester branches of the Pennsylvania Railroad, and the Junction Railroad. At the ends of the iron work approaches the present surface of Walnut street will be raised by earth embankments to the required grades.

From 60 feet east of Twenty-third street, the ascending grade to the east shore pier will be two feet per hundred, raising the present surface at the east curb of Twenty-third street two and seven-tenths feet, and lowering the present surface of Twenty-fourth street one and one-half feet, to give a clearance under the structure 12 feet in height. The new grade at this point will be fifteen and eight-tenths feet above the present

surface, giving ample head-room over the Schuylkill River East Side Railroad. From the east shore pier, the grade ascends sixty-five hundredths of a foot per hundred to half way between Thirty-first and Thirty-second streets, giving sufficient head-room for the two railroads crossed, by lowering part of those of the West Chester Railroad about two feet.

From this point the grade descends two feet per hundred to 140 feet east of Thirty-third street, giving ample head-room over the Junction Railroad, and not interfering with the headway over the tracks of the Allison Manufacturing Company, and without materially changing the present surface in front of the buildings east of Thirty-third street.

Walnut street, which has heretofore been only 50 feet in width, was placed on the city plan 60 feet wide from the Delaware to the Schuylkill rivers, and confirmed May 6, 1889, which will require the property owners when rebuilding in the future to set back to that width.

The ordinance of March 12, 1889, requires that between Twenty-second and Twenty-fourth streets, on the bridge approaches, there shall be no projection of steps, etc., beyond the 60 feet line.

The fronts of the present houses, except the few near Twenty-fourth street, are now generally set back to that width.

On the iron structure, the roadway will be 38 feet in width, allowing of four lines of rapid travel, with footways of 10 feet on each side; a total width of 58 feet. From Thirty-second to Thirty-third streets, the street would remain the present width of 80 feet.

Because of the numerous railroad tracks on each side of the river, extending west to Thirty-second street, the bridge must not only be one of unusual length, but also, one difficult of construction, compelling the use of iron, where a stone bridge, because of its permanency, would be more desirable, and increasing the cost generally beyond that of a bridge which would span the river only.

The approximate estimate of the cost is $900,000, exclusive of land damages.

Photographs have been taken, and plans and elevations made of all the buildings upon the bridge site, previous to commencing work, which will be of great value for evidence in court, in cases of suits for damages.

Bridges on the line of the Connecting Railway.

By authority of Ordinances of Councils of July 2, 1885, and March 22, 1887, contracts were made on April 27, with Cofrode and Saylor, for building bridges at Kensington avenue, K street and Frankford avenue, and including the re-formation of those streets to pass them under the railway, and a sewer for drainage. One-half of the cost of these bridges is to be paid by the Pennsylvania Railroad Company, and the balance of the total cost by the city not exceeding $85,750. About three-fourths of the work has been done and $45,276 paid on account. The bridges are of wrought iron built through girders of the Pennsylvania Railroad standard for five tracks each, upon abutments of rock range ashlar masonry.

By authority of Ordinance of Councils of March 20, 1888, a contract was made August 8, 1888, with the Pennsylvania Railroad Company for building a bridge at Sixth street, for $12,500, one-half the estimated cost of the bridge proper. The lowering of the street grade to pass under the bridge and the building of a deep sewer to drain the depression were done under other contracts, and entirely paid for by the city. The greater part of the work was done last year and completed August 8, 1889. The bridge is similar to those above described, being also for five tracks.

By authority of Ordinance of Councils of March 30, a bridge was authorized at Twenty-second street to pass that street, now being graded, under the railway. On account of urgent necessities, subsequently arising, the appropriation therefor was transferred before the contract was entered into. It will be similar to the other bridges described above.

Thirty-fourth Street Bridge.

By authority of Ordinance of Councils of March 27, 1887, a contract was entered into with the Pennsylvania Railroad Company for a bridge at Thirty-fourth street over the main line of the said company, the total cost to the city being $40,000. Work has not been commenced by reason of legal difficulties, causing some delay in carrying out one of the conditions upon which the work is authorized, that is, that Thirty-fifth street shall be vacated under the Pennsylvania Railroad, and the new Thirty-fourth street used instead.

Bridge on Lansdowne Avenue.

By Ordinance of Councils of November 6, 1888, a contract was entered into with I. H. Hathaway on December 28, 1888, for a stone bridge on Lansdowne avenue over Cobb's creek. The work was completed June 15, at a total cost of $6,835, one-half of same being paid by the city, and the other by Delaware county. The bridge consists of a brick arch of 30 feet span over Cobb's creek, with rubble masonry abutments and parapets. It is 48 feet in width, giving a roadway of 34 feet, and two footways of 7 feet each.

Bridge on Chester avenue, over West Chester Branch of the Pennsylvania Railroad.

By Ordinance of Councils of December 5, 1888, the extension of the present iron bridge was authorized, and a contract for the work made with I. H. Hathaway, December 28, 1888. The work was completed April 23, at a cost of $1,533.45. The extension consists of an additional 25 feet deck span, 21 feet wide, adjoining the north abutment of the old bridge, with iron floor beams. It was constructed to give additional facilities for access to Forty-ninth street station, by passing under Chester avenue.

Willow Avenue Bridge.

Councils, by Ordinance of March 22, 1889, authorized the construction of a bridge on the Chestnut Hill Branch of the

Philadelphia and Reading Railroad over Willow avenue. A contract was made with the Philadelphia and Reading Railroad Company April 26, 1889, and the work completed December 4, at a cost of $14,500. The bridge consists of a double track built wrought iron girder through bridge of 54 feet span over Willow avenue, resting upon abutments of rock range ashlar masonry. When the avenue is graded it will give an undergrade crossing very much desired for reaching the mills, churches, and railroad station in that vicinity.

Second Street Bridge.

Councils, by Ordinance of June 17, 1889, authorized the construction of a bridge at Second street over the Richmond Branch of the Philadelphia and Reading Railroad Company, making an appropriation of $22,500 therefor, one-half the estimated cost. On account of the increased cost of foundations, the railroad company refused to enter into a contract until the cost of the superstructure was reduced to make the total cost about $45,000. The appropriation was transferred for emergency purposes the latter part of the year, and the contract has not yet been entered into.

Poplar Street Bridge.

Councils, by Ordinance of December 31, 1888, authorized the Union Passenger Railway Company to build a bridge on the line of Poplar street, over the main line of the Philadelphia and Reading Railroad on Pennsylvania avenue, to give the former an entrance into Fairmount Park. The work is being done upon designs prepared by this Bureau, and when completed will in every way be a desirable and satisfactory improvement. The west abutment has been built, and contracts made for the iron work of superstructure.

In consequence of several severe accidents having occurred at Broad street, where it passes under the low iron bridge of the Connecting Railway, the Bureau has prepared plans for a stone arch bridge which will deaden the sound and contribute

greatly to the safety of this very important crossing. It consists of four spans of brick arches, designed to keep two spacious openings for the central drive.

In order to accomplish this improvement, the street grades will have to be lowered 3.5 feet, to give a clearance of 14.75 feet, and the street increased ten feet in width for one block.

A design was also prepared for passing the cable cars on Columbia avenue over the tracks of the P. G. and N. R. R Branch of the Philadelphia and Reading Railroad, but no definite conclusion has yet been reached to effect a change in the street grade.

Main Sewers.

By reason of the distribution of the appropriation for main sewers being made in March, all of them were completed by the end of the year, except the large sewer of Somerset street; the contract amounting to $178,000. The works themselves show the advantage in better construction gained by the city, in being executed in the favorable working months, notwithstanding the extraordinary unfavorable weather of this year. It would be better that the main sewer appropriations were specifically made in the annual appropriation bill each year. Designs and proposals were received for constructing an outlet for the Cohocksink sewer, on Germantown avenue and Shackamaxon street. By reason of the proposed abandonment in the following year of the Kensington Pumping Station by the Bureau of Water, the subject was reconsidered and contracts awarded for an outlet on the more direct and less expensive line on Norris street and Susquehanna avenue, objected to in the past on account of part of the water supply being taken at this point.

Manayunk Intercepting Sewer.

During the year, branches of the intercepting sewer were constructed along the Wissahickon and Monoshone creeks, and on Ridge avenue and Scott's lane, at Falls Village. The ordinary flow of the stream from Laurel Hill Cemetery, and

entering the Schuylkill river at Nicetown lane, was connected with the sewer. The extension of the Monoshone branch to Germantown is very much desired.

All of the mills and private houses on the main line of the sewer and its branches, from which objectionable drainage passed into the river, have been connected, with very few exceptions, and those are in process of being made. 614 original notices have been served on all property owners on the line of the sewer and its branches, as far as constructed. All parties refusing to comply are referred to the City Solicitor for legal action.

All the drainage from 29 mills, employing at least 10,000 operatives, and from 327 houses, now passes into the Intercepting sewer, and is emptied below the water supply at Fairmount. On the night of February 28, 1889, the Supervisor arrested two men for emptying refuse from water-closets at Schofield's Mill. The men and their foreman were each placed under $600 bail for appearance at Court. The cases have been held over by reason of proper connections being in progress. The owner of 27 houses at Wissahickon not having complied with the notices to connect the same with the sewer, a warrant was issued for a hearing at the Central Police Station, when the owner agreed to comply, and the houses were soon after connected.

Aramingo Canal Drainage.

While the appropriation next year for the extension of the Somerset street sewer will be sufficient to reach the Aramingo Canal, the full size of the water way below this point must remain open until the branch above at Westmoreland street is extended into the river, because the former is only designed to take a part of the drainage from the total area. It is important that the Westmoreland street sewer be continued at the earliest date.

During the year the street grades have been revised over that portion of the drainage area lying between the Philadel-

phia and Trenton Railroad, the Delaware river and Somerset street, and Frankford creek, by taking out the depression along the line of the proposed Aramingo Canal, and raising the grades to about 10 feet above the surface, with a regular decline to the river. This important work has been suggested many times in reports of past years, and was imperatively demanded by reason of the rapid improvements being made in that section. While it will probably cost the city a large sum for damages, it will be of immense value to the City Government and property owners in the future, and prevent the territory from being built up in such a way as to make the proper drainage almost impracticable.

Frankford Drainage Area.

By reason of the valuable preliminary plans prepared for this territory last year, the Bureau was able to quickly and intelligently locate the proposed Belt Line Railroad along Frankford creek, so that the main sewers proposed by the city will not be obstructed should the railroad be constructed. This reverses many former practices, where railroads have been located and constructed without reference to the future drainage of the city, forcing the city to get rid of the great difficulties and bear the expense, in consequence of injudicious location of the railroads, without reference to the growth or necessities of the municipality.

Inspection of Cements.

In past years the greater part of the cements used by this Bureau have been made by two manufactories only, and by a general understanding that the cement furnished the city contractors was to be of a higher grade and standard than the common cements in the market, the "improved" cements were produced, costing 16⅔ per cent. more. The manufactories of American cements have lately so increased in numbers, and the constant demand on this Bureau for inspection of cements delivered on the works while under construction, in addition to

the large amount of work done every year, make it absolutely necessary that systematic and constant examination and tests be made, and for this purpose I recommend that an additional draughtsman be appointed in the Engineering Bureau, who can be detailed for this purpose during the busy construction season.

The specifications for cement are as follows: "The Portland cement shall be of the best quality, weighing not less than 112 pounds per imperial bushel, and 98 per cent. by weight shall pass a wire cloth sieve of 2,500 meshes per square inch. Briquettes of neat cement, one square inch in section, seven days in water after setting, shall bear a tensile strain of two hundred and seventy-five pounds, and not exceed an average of four hundred pounds."

The natural cement shall be of the best quality, 98 per cent. by weight, shall pass a wire cloth sieve of 2,500 meshes per square inch. Briquettes of neat cement, one square inch in section, one day in water after setting, shall bear a tensile strain of fifty pounds, and after seven days in water, one hundred and twenty pounds."

Blue-Printing and Photographing.

As recommended in my report of 1887, I desire to again call your attention to the necessity of suitable rooms and appliances in the City Hall for blue-printing and photographing, and ask that the Commissioners be requested to furnish rooms for the purpose. They should be of sufficient capacity to do the work of all the Bureaus.

Registry Bureau.

The following exhibit shows the operations of the Registry Division of the Bureau of Surveys, during the year 1889:

Number of certificates of registered owners issued	8,158
Number of certificates for use of Law Department	337
Total	8,495

Receipts from certificates of registered owners	$2,039 50
Receipts from miscellaneous sources	102 00
Total receipts	$2,141 50
Number of original lots plotted	11,868
Number of transfers registered	21,370
Total plotted and registered	33,238
Total plotted and registered in 1888	28,065
Increase	5,173
Number of plans made for the use of City Departments, Bureaus, and individuals	157
Number made during 1888	52
Increase	105
Number of examinations of registry plan books made	19,547
Number made during 1888	18,717
Increase	830
Number of descriptions of property filed for registry	22,034
Filed during 1888	18,717
Increase	3,317
Number of titles perfected	2,091
Number of titles perfected in 1888	1,665
Increase	426
Number of certificates of legal opening of streets, issued to Departments, Bureaus, etc.	3,465
Issued during 1888	2,739
Increase	726
Number of certificates of registered owners in municipal lien cases for Law Department	1,383
Number during 1888	412
Increase	971

Perhaps the most important work of the year was in making a complete record of the legal opening of streets of the city, as contemplated by the Act of Assembly of March 8, 1862, which provides that the Chief Engineer and Surveyor shall cause to be copied the records filed in the Court of Quarter Sessions, which show when the streets and the roads of the City of Philadelphia were opened, and the courses and widths thereof. This labor involved the critical examination of each and every report made by road juries, and the action of the Court thereon since the year 1695, embracing 33 large volumes, of what are technically termed "Road Dockets;" the final action of the Supreme Court in each case appealed to that tribunal, the re-examination of all the deeds of dedication of streets to public use, affidavits of adverse usage of streets, opinions of the City Solicitor, and the special acts of the Legislature in opening up streets and avenues to public use.

The result of this examination was the compilation of two volumes, embracing 6,218 entries of streets legally opened, vacated, etc., an invaluable record, and which would have been completed years ago had an appropriation been made for that purpose, as repeatedly asked for by the Chief Engineer and Surveyor.

The renewal of worn-out registry plan books and street plans is progressing favorably, and an index of all the streets opened to public use has been completed.

The decrease in the number of certificates of registered owners, which has caused a falling off of cash receipts of nearly $600, is owing to the fact that some of the Land Title Companies now issue these certificates, based upon the information acquired, without cost, from this Bureau and from the Recorder of Deeds office.

The decrease of about $700 in miscellaneous receipts is because this character of work is now being done by the draughtsmen attached to the Board of Highway Supervisors, instead of in this Bureau, otherwise the work of the office shows a gratifying increase over all preceding years.

Sewer Connections and Records.

Sewer connections of 5,075 buildings were authorized during the year, which involved the issuing of 2,755 permits, with the usual inspection, draughting, and return of the reports (ordinance April 3, 1883).

The permits issued in each month were as follows:

January	54	July	283
February	20	August	319
March	221	September	279
April	249	October	312
May	325	November	303
June	266	December	64

The numbers in each ward:

First	79	Eighteenth	40
Second	29	Nineteenth	160
Third	29	Twentieth	156
Fourth	32	Twenty-first	128
Fifth	51	Twenty-second	174
Sixth	46	Twenty-third	14
Seventh	59	Twenty-fourth	314
Eighth	81	Twenty-fifth	28
Ninth	29	Twenty-sixth	83
Tenth	60	Twenty-seventh	96
Eleventh	22	Twenty-eighth	252
Twelfth	22	Twenty-ninth	243
Thirteenth	35	Thirtieth	33
Fourteenth	78	Thirty-first	26
Fifteenth	108	Thirty-second	102
Sixteenth	41	Thirty-third	78
Seventeenth	27		

The character of the drainage was:

Water closets	3,825	Slaughter Houses	15
Surface	2,209	Ice Houses	5
Sinks	782	Markets	3
Cellars	506	Breweries	3
Stables	48	For future use	450
Factories	18	Miscellaneous	20

One hundred and ninety eight drains were connected with the Intercepting sewer and its various branches, all of which

were supervised by Hiram L. Wynn, who was appointed Supervisor of the Intercepting sewer in January last.

The Bureaus of Water and Highways and the Board of Health have been furnished with the usual daily list of permits issued. The Ordinance of March 30, 1889, requires the Bureau of Highways to "cause the repaving to be done over all trenches." Complaints have been numerous that this important section is not strictly carried out.

Fifty-one (51) sewers have been built at private cost.

Three hundred and ten plans of main and branch sewers constructed were received from the District Surveyors, and duly entered in the sewer reference book.

The indexing of the inspectors' books has been continued; the number received during the year was 287, making the total number now in constant use 1,199, accumulated in five years.

The inspectors of drain connections occasionally have had their vigilance severely taxed to reach all points at which work was going on.

George W. Fox resigned on July 5, and William B. Dixey was appointed and assigned to duty on July 25 to fill his place. Mr. Dixey also sent in his resignation, which was accepted on November 30, when James H. Hendrickson was appointed, and assigned to duty on December 1.

The custom of locating the slants in sewers opposite the party wall, governed by the flow, very frequently causes the sewer to be broken when connections are made. The Board of Health approves all plans of plumbing, and the pipes are often run along the wall of the house, contrary to which the slants are placed.

The returns of sewer connections have been received monthly, but remain as turned in by the inspectors.

All moneys for permits, searches, balances, etc., were paid at the office of the Receiver of Taxes, taking his receipt therefor.

The receipts of the Bureau from all sources (except Dis-

trict Surveyors) during the year, were $29,914.32, an increase of $3,677.67 over 1888, as follows:

January	$964 80	July	$2,850 50
February	535 05	August	2,544 03
March	2,440 87	September	3,014 89
April	1,947 19	October	2,682 77
May	2,662 34	November	3,362 98
June	2,917 89	December	3,991 01

RECAPITULATION.

For sewer permits	$18,074 50
For searches in Registry Bureau	2,039 00
For sewer bills	7,947 00
For sewer balances	1,711 32
For miscellaneous receipts	142 50
	$29,914 32

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Board of Surveyors and Regulators.

Twenty-seven meetings of the Board of Surveyors were held during the year, on six of which one hundred and thirty-one plans of streets and revisions of lines and grades were considered, and parties interested were heard under oath or affirmation.

The Board sustained a severe loss in the death of Edward Darlington Roberts, of the Fourth District.

Mr. Roberts was engaged in surveying in the District of Spring Garden in 1848, and in 1860 became a member of the Board, serving continuously to the time of his decease, on September 12, 1889.

His professional experience, punctuality and fidelity, gained for him the confidence and esteem of his fellow members, and of the public.

The Fourth District thus passed under the provisions of the Act of June, 1885; Mr. Francis Lightfoot being appointed to temporarily take charge of the office of Surveyor and Regulator. He discharged the duties acceptably until October 31, when failing health compelled him to resign the office. The

present incumbent, Mr. William W. Thayer, was appointed December 15, 1889.

The Surveyors now serving under salary are:

Thomas Daly, First District.
William W. Thayer, Fourth District.
Carl A. Sundstrom, Eighth District.
Joseph Johnson, Eleventh District.
Herbert M. Fuller, Thirteenth District.

On the expiration of the term of the present elected Surveyors, on April 7, 1890, the Second, Third, and Sixth Districts will come under the provisions of the Act of 1885.

A statement of the monthly receipts and expenditures in the several districts is appended.

Gutter Complaints.

Two hundred and ninety-seven notices have been issued, under the provisions of the ordinance to under-drain objectionable footway gutters.

One hundred and three have been complied with, and twenty-four have been sent to the City Solicitor for legal proceedings.

Eleven cases have been dismissed as not objectionable, and two have been held under consideration.

One hundred and fifty-seven cases are pending.

Main Sewers.

The following main sewers were completed in December, 1888, but final estimates were not made until 1889.

Fifty-second street sewer, Monroe street to Lancaster avenue. Contractor, H. F. Sullivan; final estimate, February 13, 1889, $8,224.80; amount paid in assessment bills $3,167.95.

Lombard street sewer, from Eighth street westward. Contractor, James Deehan; final estimate, January 21, 1889, $2,055.60; amount paid in assessment bills $679.86.

Powelton avenue sewer, between Twenty-fourth street and Schuylkill river. Contractor, R. A. Malone; final estimate, March 22, 1889, $6,280.

Snyder avenue sewer, between Commercial avenue and Delaware river. Contractor, John S. Dutton; final estimate, February 19, 1889, $4,200.82

The sewer on Allegheny avenue, west of Nineteenth street to Twenty-third street, Thirty-second Ward, was built a distance of 1,763 feet 5 inches. It is an egg-shaped sewer of the following sizes:

3 feet 9 inches by 5 feet, costing $6 per foot.

3 feet 4 inches by 5 feet, costing $6 per foot.

2 feet 4 inches by 3 feet 6 inches costing $5 per foot.

Total cost $10,125.15. Contractor, R. A. Malone; Inspector, F. D. Morris.

Bainbridge street sewer, from Sutherland avenue westward to Port Warden's line of the Schuylkill river, Thirtieth Ward, is a circular sewer, 3 feet 6 inches in diameter; total length of sewer built, 215.75 feet; cost $4,530.75. Contractor, Daniel A. Kennedy; Inspector, John Vicary.

Bridge street sewer, between Thomas street and Torresdale avenue, Twenty-third Ward, was built for a distance of 1,057 feet 10 inches. It is a circular sewer of the following sizes:

4 feet diameter, costing $9 per foot.

3 feet diameter, costing $8 per foot.

Total cost will be $9,048.80. Assessment bills amounting to $2,378.79 were paid to Contractors, R. A. Malone & Co., and payments amounting to $6,480 were made in 1889. Inspector of work, N. B. Beam. Final estimate not made.

Clearfield street sewer, from Ninth street to the Connecting Railway, Thirty-third Ward, is a circular sewer of the following sizes: 8 feet 6 inches, 8 feet 3 inches, and 8 feet diameters. Total length built 1,154.25 feet, at a cost of $17.75 per foot, amounting to $20,487.93. Assessment bills amounting to $1,161.56 were paid to the Contractor, W. H. H. Achuff. Inspector, C. R. Van Horn.

Gunner's run sewer has been extended northwest of Indiana avenue and Rosehill street, Thirty-third Ward. This sewer is circular, 11 feet in diameter, costing $24 per foot; 10 feet 9 inches diameter, costing $23 per foot. Total length of sewer built, 450 feet 6 inches, costing $20,000. Contractor, James Deehan; Inspector, C. F. Brown. Final estimate not yet made.

Lombard street sewer was extended from 247 feet west of Ninth street to Thirteenth and South streets, a total distance of 1,914 feet 5 inches, costing $26,455.48. Assessment bills amounting to $2,968.95 were paid to the contractor. It is an egg-shaped sewer of the following sizes: 4 feet 6 inches by 6 feet, 4 feet by 6 feet, 3 feet by 4 feet 6 inches, and 3 feet 4 by 5 feet. Contractor, James Deehan; Inspector, E. H. Sickels.

Reed street sewer, from Schuylkill River East Side Railroad eastward to Patton street, is circular, with diameter of 4 feet by 4 feet 6 inches. It extends a total distance of 1,333 feet 4 inches, costing $12,000. Contractor, R. A. Malone; Inspector, A. F. Harkness.

Somerset street sewer, from William street and Delaware river, through Richmond coal wharves to Somerset street and westward. During the year 1889 the sewer was built 1,323 feet. It is a twin sewer, circular, 12 feet in diameter, costing $55 per foot. That portion which is 10 feet by 10 feet 4 inches diameter, 70 feet long, with iron cover, cost $89 per foot. Payments amounting to $65,504 have been made during the year 1889. Contractor, R. A. Malone; Inspectors, H. M. Smith and D. S. Rorer.

Seventeenth street and Allegheny avenue sewer, connecting with sewer at Clearfield street and Woodpecker lane. This is an egg-shaped sewer of the following sizes: 3 feet 4 inches by 5 feet, and 4 feet by 5 feet. Total distance built 1,725, feet to Allegheny avenue, costing $13,204.85. Assessment bills amounting to $1,580.37 were paid to the Contractor, R. A. Malone. Inspector, F. D. Morris.

Tasker street sewer, from Delaware river to Meadow street,

First Ward, is circular, 7 feet in diameter. The sewer was built a distance of 965 feet, costing $20,988.75. Assessment bills amounting to $2,325.75 were paid to the Contractor, H. F. Sullivan. Inspector, H. M. Smith.

Tasker street sewer, from Meadow street westward, is approaching completion. It is circular, with diameters of 7 feet 3 inches and 7 feet; 2,182 feet were built during 1889. Payments amounting to $28,576.80 have been made during 1889. Contractor, H. C. Eyre; Inspector, W. P. Brown.

Twenty-fifth street sewer is circular, with a diameter of 5 feet. It connects with main sewer on Pennsylvania avenue, and will extend to Parrish street, under J. F. Kennedy's contract. It is intended to relieve the sewer on Brown street. The work is being pushed with great energy. 470 feet were built during 1889, and 785 feet of tunneling. Payments made during 1889 were $9,424. Contractor, James F. Kennedy; Inspectors, E. H. Sickels and F. D. Morris.

Twenty-fourth street sewer, from near Clarence street to north of Lehigh avenue, is a 7 feet circular sewer. It was built a distance of 1,000 feet, and completed 1889. Final estimate not yet made. Contractor, George W. Ruch; Inspector, C. R. Van Horn.

Wingohocking sewer, on the line of Heiskell street and Willow avenue, Twenty-second Ward, is circular, with a diameter of 8 feet 6 inches; total length built, 708 feet, 6 inches; cost $12,600. Contractor, D. McMahon; Inspector, W. L. Holbrook.

Washington street sewer, from Delaware river to Spring street (Tacony), is a 5 feet circular sewer. Total length of sewer built, 928 feet 8 inches, costing $11,854.95. Assessment bills amounting to $1,141.74 were collected. Contractor, H. F. Sullivan; Inspector, H. M. Smith.

Wissahickon Valley Sewer.

This is one of the branches of the Intercepting sewer, projected for the drainage of the western portion of Germantown and vicinity.

SECTION 3. This section was awarded to H. C. Eyre. Work begun in November, 1888; final estimate made June 3, 1889; 377.61 feet of 2 feet 4 inches by 3 feet 6 inches, egg-shape, and 776.68 feet of circular sewer, 5 feet in diameter, were built, costing $17,999.99. Contractor, H. C. Eyre; Inspector, F. J. Watt.

SECTION 4. This section was awarded to H. F. Sullivan. It is circular, 5 feet in diameter. Total length built, 1,164.24 feet costing $13,970.88. Inspector, F. J. Watt.

Monoshone branch sewer is a continuation of Wissahickon Valley system, eastward of the Wissahickon sewer. At Rittenhouse lane it is circular, 3 feet 6 inches diameter. Total length of sewer built, 1,012.65 feet, costing $7,999.93 Contractor, H. C. Eyre; Inspector, F. J. Watt.

Connections with Intercepting Sewer.

Connections on Main street, from near Levering street to Centre street (vacated), Manayunk, with Intercepting sewer, are terra-cotta pipe, of the following lengths and sizes:

86 feet of 10-inch pipe.
801 feet of 12-inch pipe.
496.13 feet of 8-inch pipe, and
28.5 feet of 12-inch pipe,

costing altogether $4,207.35. Contractor D. A. Kennedy; Inspector, C. Y. Lauderbach.

Main, Washington, High, Hamilton, and Church streets, Manayunk, are terra cotta pipe sewers, connecting with the Intercepting sewer, of the following lengths and sizes: 114 feet of 8-inch pipe; 940 feet, composed of the following sizes: 15-inch, 12-inch, 8-inch, 833.2 feet of 10-inch pipe, 491.1 feet, composed of the following sizes: 10-inch and 8-inch pipes, costing altogether $10,365.60. Contractor, W. H. H. Achuff; Inspector, C. Y. Lauderbach.

Nicetown lane sewer, connecting with Intercepting sewer, is "D" shaped, 4 feet 6 inches by 5 feet, and was built to carry storm-water into Schuylkill river. Total length 91 feet,

and 93 feet of 12-inch terra cotta pipe; sewer costing $1,510.20. To make the work complete $600 was paid by the Laurel Hill Cemetery Company for the portion on its property. Contractor, James Deehan; Inspector, C. Y. Lauderbach.

Ridge avenue and Scott's lane sewer is a pipe sewer, connecting with the Intercepting sewer. Total length 743 feet of 12-inch terra cotta pipe; costing $7,580.30. Contractor, Daniel A. Kennedy; Inspector, C. Y. Lauderbach.

Cohocksink Sewer.

The work of repairing Cohocksink sewer, at Germantown avenue above Second street, was continued by Contractor H. S. Hong, the amount expended being $7,843.26.

A contract, limited to $7,000, was made June 4, 1889, with John McParland. Serious breaks, occurring at Germantown avenue below Second street, and on Thompson and Third streets, were, after a series of difficulties, repaired at a cost of $27,000, of which amount $20,000 was from appropriations to the Bureau of Highways.

A further inspection of the sewer showed that additional repairs were necessary, and a dangerous break occurring at Van Horn street and Germantown avenue, was repaired by Contractor John McParland, at a cost of $5,928.46.

Another break occurring on Thompson street, west of Third street, required the sewer to be repaired as far west as Charlotte street, at a cost of $12,000. Work was done, under emergency, without appropriation, and was completed before the end of the year. The condition of Cohocksink sewer is very bad, and will still require a large expenditure of money to put it in anything like a safe condition.

Willow Street Sewer Repairs.

The work of repairing Willow street sewer was done by Charles A. Porter. The repairs at Eighth and Willow streets cost $6,052.70.

The repairs at St. John and Willow streets, on Willow street from St. John to Second street, was done by Charles A. Porter, under emergency, without an appropriation, and completed before the end of the year.

The total length of sewers built and inspected during the year 1889 was 35.54 miles, divided as follows: main sewers, 3.33 miles; Branches of Intercepting sewer and connections, 1.52 miles: Branch sewers, 28.75 miles; Branch sewers at private expense, 1.94 miles.

Description.	Feet.	Miles.
Main sewers	17,592.40	3.33
Branches of Intercepting sewer and connections	8,048.13	1.52
Branch sewers	151,752.50	28.75
Branch sewers (at private cost)	10,285.00	1.94
Total	187,678.03	35.54

The total length of branch sewers now constructed is 301.31 miles.
Total length of main sewers constructed..... 66.59 "

Total length of sewers..... 367.90 "

Mr. John Kay Little, who has faithfully served the city as draughtsman and assistant engineer for seventeen years, resigned on September 30, and Mr. Gustavus K. Moorehead was appointed in his place.

The usual tables are appended, which show that more work has been done by the Bureau than in former years, although the work in 1888 exceeded by 50 per cent. any previous year.

Respectfully submitted,

SAMUEL L. SMEDLEY,
Chief Engineer and Surveyor.

Bureau of Survey Annual Reports
Indexes to volumes from 1883 to 1923.

Indexes contain material related to sewers and streams only.

NOTE

These indexes were compiled by several interns between 2002 and 2004. Some are more detailed than others, depending on the initiative of the individual intern. While they have not been meticulously proofread, they should provide a good indication of the selected contents of each volume.

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Photo, caption “Falls Bridge over Schuylkill River, during erection”

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“Intercepting System”
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Page 74
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Photo, caption “Concrete Sewer on Swanson St. at Snyder Ave.”

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Photo, caption “Cradle of Twin Sewers in Aramingo Canal”

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Photo, caption “Twin Sewers in Aramingo Canal”

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“Cohocksink System”

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Photo, caption “Reconstruction of the Cohocksink Sewer on Eleventh St. North of Norris St.

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“Branch Sewers and Inlets”

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Table of total cost for the construction of 35.271 miles of branch sewers.
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“Miscellaneous Public Improvements”

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“Mingo Creek Pumping Station”
“Testing Laboratory”

Page 86
“Bridges”

Page 86 opp.
Photo, caption “Gray’s Ferry Bridge. View of South side of bridge, looking East”

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I. Main Sewers
II. Branch Sewers
III. Rainfall, Discharge and Tidal Observations

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IV. Main Sewers
   A. $358,000 is appropriated for construction of Main Sewer
   B. $300,000 is appropriated for the following sewers:
      1. Extension of Montgomery relief sewer in Columbia Ave. from terminus of present contract to 20th
      2. Rosehill from Allegheny to the Connecticut Railway
      3. Extension of Shunk on Weccacoe from Oregon to Shunk and on Shunk from Weccacoe westward
      4. York from Aramingo to Emerald (appropriation insufficient to complete)
      5. Thomas Run extension on Frazier from terminus at Whitby to Willows and on Willows to 57th on 57th and on Florence to Cobbs Creek (insufficient to complete)

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      6. Extension of Branch of Merion creek sewer through private property from terminus near Overbrook to City
      7. Orthodox from Delaware River to Richmond (insufficient to complete)
      8. Extension of East Branch of Wingohocking Creek on Stenton from terminus near Cora to Anderson and on Anderson northwest to Creek
      9. Extension of Pratt from present terminus at Willow to Charles (insufficient to complete)
      10. Extension of Cohocksink relief system on Mascher from Girard to Thompson
      11. Extension of Thomas Run sewer in Conestoga from South to Pine
   C. $50,000 was appropriated for the extension of the McKean relief sewer, from Swanson west to, to which $8,000 was later added by Ordinance
   D. All of the above work is under contract; some has been completed, the rest are progressing, with the exception of a branch of the Merion sewer, which has been delayed and will commence as soon as weather permits
   E. A detailed statement of the above work is as follows:

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      1. Charles Creek drainage system extension in 65th from Buist to Woodland. A total of $19,730.61 was paid to the contractor from 1891-1901

2. Chestnut Street from 56th to 59th and on 59th from Chestnut to Arch. A total of $21,761.26 was paid to the contractor before and during 1901.
3. Magee from Delaware River to Milnor. Total cost was $19,980.45, paid from 1900-1901
4. Mantua Creek sewer reconstruction on 37th from Mantua to Brown and on Brown from 37th to 38th. A total of $ 21,418.13 was paid to contractor.

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5. Montgomery relief sewer extension in Sydenham from end of present contract to Columbia and on Columbia from Sydenham to 20th. The contractor received a total of $40,927.54
6. Oxford relief, from 30th to 26th. A total of $ 32,464.10 was paid.
7. Orthodox, from the Delaware River to Carbon. Total cost: $19,999.98
8. Pratt, from present terminus at Willow to Charles. Contractor received a total of $13,760

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9. Rosehill from Allegheny to the Connecticut Railway. Work is still in progress. Contractor has received $7,840
10. Extension of sewer on Robinson, Race, 62nd and Market from terminus south of Vine to 63rd. A total of $20,916.44 has been paid
11. 62nd sewer extension from north of Arch to Market and on Market westward to terminus of present contract. Total cost: $17,124.65
12. Thomas Run sewer extension on 55th from south of Baltimore to a point near Thomas. Total cost: $13,561.48

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13. Thomas Run sewer extension in Conestoga from South to Pine. Work is still in progress. A total of $5,712 has been paid
14. Thomas Run extension in Frazier from present terminus at Whitby to Willows and on Willows to 57th and on 57th to Florence. Work is still in progress. $9,020 has been paid

V. Intercepting System

A. During the year the work was completed upon the contract made in 1900 for the connection with the Intercepting sewer in Ridge Avenue from the Philadelphia and Reading Railway to Scott's Lane, on Scott's Lane to Indian Queen Lane
B. In order to not interfere with traffic on the double line of street cars on Ridge, 496 feet of this sewer was constructed in tunnel.
C. The work upon the extension of the Lincoln Avenue intercepting sewer, contracted for during 1900, was continued and is nearing completion
D. The construction work performed upon the intercepting system follows:
    1. Lincoln extension, from Sedgewick to Cresheim, and on Cresheim to Mt. Pleasant. Total cost: $12,936. Work is still in progress
    2. Ridge and Scotts, connections with the intercepting sewer from the Richmond Branch of Philadelphia and Reading Railway to Scotts from Ridge to Indian Queen. Total cost: $25, 340.

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VI. Wingohocking Creek System

A. Work was carried on in this system as follows:
    1. 1st, East Branch (two contracts)
    2. 2nd, West Branch, northwest of Sharpnack
    3. 3rd, extension of outlet on Courtland east from Ninth
B. A statement of the years work is as follows:
    1. Courtland main sewer extension from terminus near Ninth eastwardly. Total cost: $21,879.76
    3. East branch of Wingohocking on proposed street, Twenty-first, Godfrey and Stenton, from stream south of Church to Cora. Total cost: $61,250.88
    4. Wingohocking Sewer, extension of west branch through private property on line of proposed Bellfield Avenue, from present terminus near Sharpnack to Sprague and on Sprague to Mt. Pleasant. Work is still in progress.
    5. Wingohocking sewer, extension of east branch in Stenton from present terminus at Cora to Anderson and on Anderson northwestwardly to the creek.

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VII. Frankford Intercepting System
A. The condition of the Little Tacony Creek is growing yearly more unbearable, making it imperative to carry out plans for improvement.
B. A relief from these conditions is urgent

VIII. Drainage in the First and Twenty-sixth Ward
A. The City during the year entered into a contract for the extension of the Shunk Street system.
B. This system when completed will permit the development of valuable real estate in the vicinity of Broad and the Baltimore and Ohio Railroad.
C. Work on the McKean relief sewer has been completed

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D. It is recommended that funds be appropriated to complete the relief sewer, which will remedy the overflow of Thirteenth and Morris
E. A detailed statement of the work upon sewers in this territory is as follows:
    1. McKean relief sewer in Swanson, from Snyder to McKean, and on McKean, from Swanson westwardly
    2. McKean relief sewer in McKean, from Swanson westwardly
    3. Extension of Shunk sewer system on Weccacoe, from Oregon to Shunk, and on Shunk, from Weccacoe westwardly

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IX. Aramingo System
A. In 1839 a contract was entered into for the construction of a sewer in the bed of Aramingo Canal from Norris to the Delaware River, including the construction of the bulkhead wall of concrete at the bulkhead line or outlet of the canal.
B. Owing to numerous obstacles and damage due to floods, progress made in the portion of the sewer east from Richmond was very slow. A concrete section has been completed between Richmond and Beach. The invert and side walls between Beach and the Delaware River are practically completed.

C. The tributary branch sewers included under the contract were completed.
D. Work was also begun upon a main relief sewer in York from Aramingo Canal to Emerald.
E. The following is a statement of the year's progress: York from Aramingo to Tulip. Total cost: $ 14, 560

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X. Cohocksink System

A. The work of continuing the old Cohocksink Sewer under the contract made in 1900 was continued to a point near Diamond, though it was realized that work would need to be continued as far as Twelfth
B. One serious break occurred at Fifth and Thompson, which was repaired by the Bureau of Highways
C. The work upon the relief to the Cohocksink Sewer in Shackamaxon, from Delaware River to Thompson, and on Thompson westward was continued
D. Construction of the concrete outlet at the river is progressing favorably. A contract was also made for a sewer comprised under this system in Mascher, from Girard to Thompson
E. The following is a detailed statement of the completed work in the Cohocksink system:
    1. Cohocksink sewer construction on Norris, from Ninth to a point east of Eleventh. Work consisted of repaving the street over the sewer and repairing manholes, laterals, etc. Total cost: $47,639.80
    2. Reconstruction in Norris, from a point on Eleventh, from Norris to Diamond, and on Diamond, from Eleventh to Twelfth. Work is still in progress.
    3. Relief to the Cohocksink sewer on Shackamaxon, from the Delaware to Thompson, and on Thompson to Mascher. Work is still in progress
    4. Cohocksink sewer relief extension in Mascher, from Girard to Thompson. Work is still in progress.
    5. Reconstruction of sewer on Thompson, across Fifth. During a heavy storm on August 19,1901, the Cohocksink broke on Thompson, immediately east of Fifth. Immediate steps were taken to repair this break but due to another storm on August 31st, September 3rd and September 11th 1901, the break was greatly enlarged and work was delayed. Repairs were completed November 20th, 1901

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XI. Urgent Main Sewers

A. The following is a list of main sewers for which there is a special urgency:
    1. Extension of sewer from Sixty-third and Market to Cobb's Creek
    2. Extension of Thomas Run sewer to Cobb's Creek
    3. Extension of Pratt street sewer
    4. Branch of Thomas Run on Florence
    5. Sixtieth and Trinity to Fifty-ninth and Chester
    6. Extension of Thomas Run to Fifty-sixth and Fifty-third and Locust
    7. Extension of Orthodox street sewer to Richmond
    8. Extension of George's Run sewer to City Line

9. Dobson's Run sewer extension
10. Rock Run sewer on Ashdale, west of Philadelphia and Newton Railroad

B. There are a number of sewers whose necessity for repair grows more urgent each year, which are the following: Indiana, between Ormes and Fifteenth, and Jackson, between the Schuylkill and Thirtieth

XII. Deeper Main Sewers

A. Due to the construction of many tall buildings and the amount of people that congregate in basements and cellars during business hours, a new system of drainage is needed

B. Deeper sewers will be required for Market, Arch, Chestnut and Walnut, between the Delaware River and 15th

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XIII. Branch Sewers and Inlets

A. $215,000 was appropriated by Ordinance of December 31, 1900 for branch sewers and inlets

B. 192 contracts were drawn for Branch Sewers, of which 187 were completed

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Pg.7

I. Main Sewers

A. Work accomplished in perfecting the main sewer systems and improving the sanitary conditions has been pronounced

Pg.8

B. Total number of main sewers under construction, some of which were carried over from last year, was 37; 19 were completed

C. Reconstruction of Cohocksink sewer on Norris, 11th, Diamond, and 12th was completed

Pg.9

D. Policy pursued by Department in reconstructing the portions of old Cohocksink sewer, resulted in giving the City a new sewer for the greater part of its length

Pg.10

E. No direct appropriation in 1902 for purpose of constructing connections to the intercepting sewer, but a number of extensions have been made under specific ordinances (8 contracts and extensions built cover 2 miles)

Pg.11

F. Extension of the main intercepting sewer from the American Pulp Works to Shawmount Avenue, on Shawmount Avenue to the new filter plants at Roxborough, is now under construction

G. Section was completed and the drainage of a considerable territory will be provided for by emptying branch sewers into this main at Mt. Pleasant avenue

H. A beginning was made in the construction of the Frankford intercepting system by placing under contract, the outlet section of the sewer on Wakeling street, between Frankford creek and the Philadelphia and Trenton Railroad, it is urgent that this work be continued

Pg. 12

I. The sewer in McKean Street and that on Porter Street should be extended as rapidly as possible to Broad Street, to furnish much needed relief in the lower section of the city

J. Work upon the outlet for the Aramingo Canal main sewer was finally completed

K. For the year 1903, an additional sum of $100,000 has been provided for the continuation of this relief sewer and will complete it to 9th and Berks streets

Pg.13

L. Attention is called to the increasing pollution of the Schuylkill river below Fairmount dam

M. Increase in the number of real estate developments brings immediate return to the City in the shape of taxes; in view of these facts, the Department recommends he construction of main sewers

Pg.14

N. The relief sewer which is designed to carry the drainage of Germantown and Chestnut Hill on a high level, from the water shed of the Wissahickon to the water shed of the Delaware river, still awaits an appropriation before anything can be done

Pg.15

II. Branch Sewers

A. The term "branch sewers" includes all sewers of less than 4 feet in diameter

B. For the reconstruction of inlets, $5,000 appropriated

C. 288 drain connections were made with the Manayunk Intercepting Sewer and its branches

Pg.18

III. Harbor Work and Dredging Delaware and Schuylkill Rivers

A. Ordinance of July 27, 1901 carried an appropriation of $250,000 for purpose of deepening the channels of Delaware and Schuylkill rivers

Pg.19

B. The work accomplished under this contract and which was completed during the past year consisted of removing the shoals along the Tinicum Island Range, above Chester, in the Delaware river, and dredging in the Schuykill river from the lower back channel, at League Island, north

Pg.22

IV. Rainfall, Discharge and Tidal Observations

Pg.95

V. Main Sewers (map)

Pg.96

A. Sum of $200,000 appropriated by ordinance of March 31, 1902 as follows

1.) 21st, from Indiana to Allegheny

2.) Extension of York street relief sewer from terminus of present contract, near Tulip to Emerald

3.) Extension of sewer in Pratt, from terminus of present contract, near Mulberry, to Valley and southwest on Valley to creek near Walker

4.) Extension of Georges Run Sewer from present terminus at Bryn Mawr north of Wynfield, on Bryn Mawr to Woodbine, on Woodbine to 51st to City Ave.

5.) Extension of Thomas Run Sewer on Pine from Conestoga to 53rd, thence on 53rd north to terminus of present sewer at Locust

6.) Orthodox street, from present terminus east of Delaware avenue to Richmond

7.) East Branch of Wingohocking Creek, on Anderson from terminus of present contract northwest of Chelten to Price, thence on Price from Anderson to Crittenden, and on Crittenden to Creek northwest of Haines

8.) Extension of Lincoln avenue Intercepting Sewer in Cresheim road, from Mt. Pleasant to Allen's lane

B. Appropriation of June 27, 1902, set aside from the loan of June 11, 1902, was apportioned by ordinance approved July 19, 1902, as follows:
1.) Completion of York Street Relief Sewer
2.) Completion of Georges Run Sewer
3.) Completion of the above contract of East Branch of Wingohocking Creek Sewer to Haines street

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4.) Extension of McKean Street Relief Sewer to 9th
5.) Extension of Main Intercepting Sewer from present terminus at Nixon's Mills, northeast of Fountain street on private property to Shawmont, thence north on Shawmont to Eva
6.) Princeton street, from Delaware river to Hegerman
7.) Frankford Intercepting System, on Wakeling, from Frankford creek northwest
8.) Extension of Thomas Run Sewer on 57th, from present terminus at Florence to Beumont, thence south on Beaumont to a point near 59th, thence across private property to Cobb's creek
9.) Extension of Shunk Street System, from present terminus west of Shelby to Front, and on Front to Porter, and west on Porter
10.) Extension of Cohocksink Relief Sewer on Thompson from terminus of present contract to Germantown, on Germantown to Berks, on Berks to 9th, thence north on 9th to Norris
11.) Extension of Dobson's Run System, from terminus in Roberts to Ontario, thence on Ontario to 33rd, on 33rd to Allegheny, and on Allegheny to 29th
12.) Extension of West Branch of Thomas Run Sewer, in Pine from Conestoga to Allison, on Allison to Locust, thence west on Locust to present sewer near 56th
13.) Extension of Wingohocking Creek Sewer, in Courtland from present sewer west of 7th to 7th and Annsbury, thence on Annsbury to North Penn Branch of Philadelphia and Reading Railway

Pg.98

14.) Disston, from Mason to Keystone
15.) Jackson, from Schuylkill river east
16.) Indian Run Sewer, in 66th, from City south to Sherwood and 68th, thence on 68th to Malvern, on Malvern on 68th, thence south on 69th to Lansdowne
17.) East Branch of Wingohocking Creek, on Ogontz from 18th and Bellfield to Olney
18.) Extension of Cresheim Creek Intercepting sewer in Germantown from Cresheim creek to Moreland, on Moreland to proposed drainage, thence to Willow Grove, on Willow Grove to 25th, along 25th to Hartwell, along Hartwell to stream east of 25th

C. Detailed statement of the above work completed or as far advanced, also of work commenced in previous years and completed during 1902 where not included under other headings, is as follows:
1.) Disston, from Mason to Keystone

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2.) Georges Run Sewer Extension on Bryn Mawr form present terminus north of Wynnewood to Woodbine, on Woodbine to 51st, and on 51st to City
3.) Indian Run Sewer in 66th from City to Sherwood and 68th, thence on 68th to Malvern, and on Malvern to creek at 69th
4.) Montgomery Relief Sewer extension in Sydenham, from end of present contract to Columbia, and on Columbia from Sydenham to 20th
5.) Merion Creek Sewer Extension through private property from present terminus near Overbrook to 59th, and on 59th to City Line

Pg.100

6.) Mantua Creek Sewer reconstruction on 37th, between Mantua and Brown, and on Brown, from 37th to 38th
7.) Pratt Sewer Extension from present terminus at Willow to Charles
8.) Orthodox Street Sewer Extension from present terminus east of Delaware to Richmond
9.) Pratt Sewer Extension from present terminus near Mulberry to Valley, and on Valley southeast to creek near Haworth

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10.) Princeton, from Delaware to Hegerman
11.) Rosehill Sewer from Allegheny to the Connecting Railway
12.) Thomas Run Sewer Extension in Frazier (56 ½) street from present terminus at Whitby to Willows, on willows to 57th, and in 57th to Florence
13.) Thomas Run Sewer Extension in Conestoga from South to Pine

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14.) 21st, from Indiana to Allegheny
15.) Thomas Run Sewer Extension in Pine from Conestoga to 53rd, and on 53rd to Locust
16.) Thomas Run Sewer Extension (west branch) in Pine, from Conestoga to Allison, on Allison to Locust, and on Locust west to terminal of present sewer, near 59th
17.) Thomas Run Sewer Extension in 57th from present terminus at Florence to Beaumont, thence south on Beaumont to a point near 59th, thence across private property to Cobb's creek

Pg.103

VI. Intercepting System

A. Lincoln Avenue Intercepting Sewer was designed and extended to the head of the drainage area
B. Also a tributary to the Cresheim Intercepting Sewer on Germantown, from Cresheim creek to Moreland, on Moreland from Germantown to a proposed drainage street
C. An extension of the Manayunk Intercepting Sewer has been designed and placed under contract from this present terminus at Nixon's Mills northeast of Fountain street, between the Schuylkill Canal and the river, under the canal by inverted siphon [sic: siphon], and along the towing path of the river to Shawmont, and on Shawmont from the Schuylkill river to Eva

Pg.104

D. An extension of the Dobson's Run Intercepting Sewer was placed under contract from the present terminus in Roberts to Ontario, thence to 33rd to Allegheny, to 29th, needed to drain a developing portion of the 38th Ward

E. For the improvement of the service performed by this sewer, the following recommendations are made for necessary extensions:

1.) First: The building of the Cresheim branch connection on Germantown, from a point where it may be completed with the present appropriation to Moreland, to proposed drainage, to Willow Grove, to 25th, to Hartwell, to stream east of 25th

2.) Second: The extension of the Wissahickon High Level Sewer to Rex to intercept the drainage from the western side of Chestnut Hill is important

3.) Third: Funds should be provided to begin the construction of a sewer through the divide between the Delaware and Schuylkill rivers in the vicinity of Queen Lane Reservoir

Pg.105

F. A statement of construction work performed in connection with the intercepting system follows:

1.) Intercepting sewer (main stem) extension from present terminus at Nixon's Mills, northeast of Fountain on private property to Shawmont, and on Shawmont to Eva

2.) Lincoln extension of the intercepting sewer from Sedgwick to Cresheim, and on Cresheim to Mt. Pleasant

3.) Lincoln Intercepting Sewer Extension on Cresheim from Mt. Pleasant to Allen's

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VII. Wingohocking Creek System

A. Work has been carried on upon three sections of Wingohocking system, the east branch, both ends of the west branch and the outlet section

B. Work accomplished during the year as follows:

1.) Wingohocking Creek Sewer Extension (west branch) through private property on line of proposed Bellfield, from terminus near Sharpnack to Sprague, on Sprague to Mt. Pleasant

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2.) Wingohocking Creek Sewer Extension (east branch) in Stenton from present terminus at Cora to Anderson, and on Anderson northwest to the creek

3.) Wingohocking Creek Sewer Extension (east branch) on Anderson from terminus of present contract north of Chelten to Price, and on Price to Crittenden, and on Crittenden to creek northwest of Haines

VIII. Drainage in the 1st, 36th, and 39th Wards

A. Rapid increase in building operations...has emphasized the need for rapid construction of main sewer beginning at Oregon and Delaware river and extending on Swanson, Shunk, Front, and Porter

Pg.108

B. Another project, that of providing main drainage for a section on the west side near the Schuylkill river, north of Point Breeze, has been started, by

constructing a sewer on Jackson, form the Schuylkill east to 29th and north on 29th to Tasker

Pg.109

C. Work accomplished upon main drainage in this section in detail follows:
1.) Jackson, from Schuylkill River east
2.) McKean Relief Sewer Extension on McKean from Swanson west

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3.) McKean Relief Sewer Extension from terminus of present contract at 3rd west
4.) Shunk Sewer System, extension on Weccacoe from Oregon to Shunk, and on Shunk from Weccacoe west
5.) Shunk Sewer System, extension on Shunk from present terminus west of Shelby to Front, on Front to Porter, and on Porter west

IX. Frankford Intercepting System

A. Frankford Intercepting System may be comprehensively described as follows:

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1.) Pollution of Little Tacony creek from lateral sewers emptying into it between Pratt at Frankford and Frankford creek, is to have made it highly objectionable
2.) System planned to divert flow of stream along Wakeling into Frankford creek and intercept drainage emptying at present into the Little Tacony creek south of Wakeling by building a sewer along Valley, Margaret, and Torresdale, emptying below Lewis

X. Aramingo Canal System

A. Main sewer in the bed of Aramingo Canal from Norris to Delaware River, was completed this past year

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B. The extension of the sewer from Norris to the Delaware river has done away with the unsightly condition which existed when it was a canal
C. Another improvement to the Aramingo System has been the design and construction of a relief sewer on York, between Aramingo and Emerald, intended to remedy the conditions which have existed at the latter point and vicinity, causing overflows and damage to the property
D. The work of construction is reported upon in detail as follows:
1.) York Sewer from Aramingo to Tulip
2.) York Sewer Extension from Tulip to Emerald

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XI. Old Cohocksink Sewer

A. Contracts for reconstruction were in force as follows:
1.) Cohocksink Sewer, reconstruction in Norris, from a point 97 feet east of 11th, on 11th from Norris to Diamond, on Diamond, from 11th to 12th, and on 12th north

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2.) Cohocksink Sewer reconstruction on Montgomery from a point east of 9th, and on 9th north

XII. Cohocksink Relief Sewer

A. The Cohocksink Sewer has been overcharged, and measures have been under consideration for relieving this condition

B. Project adopted may be described as follows:

1.) From present sewer on 9th, at Berks, the capacity of an 8 feet diameter is to be diverted from it, carried east on Berks to Germantown, thence on Thompson, where an overflow from the present 10 feet diameter is provided

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2.) New sewer continues on Thompson, east to Frankford, thence on Shackamaxon to the Delaware River

C. A detailed report of work follows:

1.) Cohocksink Relief Sewer extension in Mascher, from Girard to Thompson

2.) Cohocksink Relief Sewer extension in Germantown, from Thompson to Montgomery

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3.) Cohocksink Relief Sewer in Shackamaxon, between the Delaware River and Thompson

4.) Cohocksink Relief Sewer in Thompson, from Shackamaxon to Germantown

XIII. Urgent Main Sewers

A. Extension from 63rd and Market to Cobbs creek

B. Extension of Orthodox to Richmond

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C. Extension of Porter street sewer

D. Extension of Pratt Street

E. Extension of Ogontz, from Olney north

F. Extension of Wakeling sewer (Frankford intercepting system)

G. Extension of Courtland to North Penn R.R

H. Reconstruction of 42nd sewer

I. 12th relief sewer

J. Extension of McKean street relief sewer

K Indiana, between Ormes and 15th

L. Jackson street extension to 30th

M. Rock Run on Ashdale west of Philadelphia and Newtown R.R.

N. Reconstruction on York and 5th

O. Opposite is a map showing the main sewerage system, with a special mark it distinguish those built or under contract during the last 4 years

XIV. Sanitary Recommendations

A. Owing to the increasing pollution of the Schuylkill river below Fairmount dam, it is advisable to take measures to remedy its condition

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B. A project for intercepting the sewers on each side of the river and carrying the sewage to the low land near the mouth of the river has been studied in a preliminary way

XV. Branch Sewers and Inlets

A. The contracts drawn for branch sewers numbered 226, of which 180 were completed

B. 20.95 miles of branch sewers at public expense

C. 9 contracts, the work under which included construction and reconstruction of 544 inlets

Pg.120

XVI. Summary of Work Upon Sewers

A. Number of main sewers under construction was 37

B. Total length of sewers built and inspected during 1902 was 29.918 miles

XVII. Sewer Connections and Records

A. Sewer connections of 5,561 buildings were authorized during the year, which involved issuing of 2,986 permits

Pg.122

B. 280 drains were connected with Manayunk Intercepting Sewer and its branches

C. Bureaus of Water, Highways, and Health have as usual been furnished with a daily list of all permits issued

D.55 sewers have been built at private cost

E. 288 plans of main and branch sewers were received from District of Surveyors

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XVII. Miscellaneous Projects for Improvement

A. Foremost under this head are those upon proper plans for City development in suburban sections

B. The establishment of lines and grades for the low lying territory in the 40th Ward, comprising 5,000 acres between Schuylkill River and Darby creek

C. It is proposed to raise the whole grade to provide for a development which will make this an urban section in a few years

Pg.129-133

XX. Rainfall, Discharge and Tide Observations

A. Table displaying principal rainfalls during the year, including amounts of precipitation, duration and the mean and maximum rate per hour

B. Diagram of Tides for 1902 at Arch Street Pier

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XXI. Map of the Delaware River Showing Sites of Dredging Operations by the City of Philadelphia

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XXII. Harbor Work and River Dredging

A. Work in Delaware River results in opening of a channel 26 feet deep for the first 20 miles of river below the Philadelphia Harbor

1.) Removal of the middle ground opposite Greenwich Point and extension of deep water of the harbor from Morris to Avenue 38, South

2.) Formation of a channel through the Fort Mifflin bar

3.) Removal of shoals along the Tinicum Island Range

4.) Removal of dangerous ledge rock shoals at Schooner Ledge

5.) Formation of a channel 200 feet wide and 6.48 miles long from Marcus Hook to Schooner Ledge

B. Work in the Schuylkill River

1.) formation of a continuous channel 250 feet wide dredged to a clear depth of 22 feet below mean low water, from Penrose Ferry bridge to 58th, a distance of 3 miles, the depth of a portion of which was

increased to 26 feet

2.) formation of a continuous channel 150 to 250 feet wide, with a clear depth of 20 feet below mean low water, from 58th to a point about 500 feet above Harrison's wharf, a distance of 1.7 miles

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C. Under the authority of the projects of the War Department, removal of 3,297,752 cubic yards of material other than rock and 29,257 cubic yards of rock from the Delaware and the Schuylkill

D. In response to the agitations of the trades organizations of the City, appropriations of $250,000 were made on July 27, 1901 to deepen the channels of the Delaware through the shoals along the Tinicum Island Range, above Chester and in the Schuylkill from its mouth northward

1.) Plan specifications required that all materials dredged from the rivers behind impounding banks be deposited within the limits of League Island Park. This did the following:

a. Prevented already dredged material from once again washing out into the river and creating shoals
b. Improved river channels
c. Hastened the completion of the improvement of the park

2.) Work contract was awarded to the lowest bidder, the American Dredging Company, on September 27, 1901 and notice to begin work was given October 15th

E. Placing materials ashore League Island involved the excavation of a receiving basin about 200 feet wide by 700 feet long and 15 feet deep at a mean low water in the upper back channel at about the lines of 11th street, and an entrance canal from the Delaware of about 4,400 feet

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F. Work on the banks for the impounding basins began October 2, 1901 and on the dredging of the canal and receiving basin on October 9th

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G. Work in the Schuylkill consisted of dredging a channel at the lower back channel at League Island northward and was begun April 14, 1902

H. All dredging of the channels was completed on September 7, 1902

I. A total of 296, 670 cubic yards of material was dredged from the channel of the Schuylkill below the Penrose Ferry Bridge, and 68, 654 cubic yards of material other than rock and 17 cubic yards of boulders from the channel above the bridge

J. Work in the Schuylkill resulted in the formation of a channel 250 feet wide, 26 feet deep and 1.01 miles long, from its entrance at League Island to a point 837 feet above the Penrose Ferry Bridge

K. The following plant was used by contractors on the channel work:

1.) The combination dredges "Admiral" and "Republic"
2.) The grapple dredges "Philadelphia", "Arizona" and "Columbia"
3.) A fleet of 8 tugs and 48 dump scows, of ranging capacities of 250 to 525 cubic yards

L. The final estimate was drawn on September 15, 1902 and the contract's total amount was $234,430.77

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M. Because the Federal Government now has under contract the dredging of a 30 feet deep channel in the Delaware, it is the aim of the City's trade and commercial organizations to secure aid for the further improvement of the Schuylkill and the dredging of its channel to a depth of 26 feet below mean low water
N. $400,000 was set aside from a loan for the improvement of the Delaware and the Schuylkill

XXIII. Tables and Charts

A. Summary of Dredging Operations for the Improvement of the Channels of the Delaware and Schuylkill Rivers (Pg. 167)
B. Length and Cost of Main Sewers Built during the Year 1902 (Pg. 170)
C. Aramingo Canal System (Pg. 170- facing)
D. Branch Sewers (Pg. 178)
E. Summarized Statement of Branch Sewers Built During the Year 1902 (Pg. 181)

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I. Main Sewers
Pg. 30
II. Branch Sewers
III. Rainfall, Discharge and Tidal Observations
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IV. Main Sewers
A. Councils appropriate $358,000 for the construction of Main Sewer
B. By Ordinance, $300,000 was apportioned to the following sewers:
1.) Extension of Montgomery relief sewer in Columbia from terminus of present contract to 20th
2.) Rosehill from Allegheny to the Connecticut Railway
3.) Extension of Shunk street system on Weccacoe from Oregon to Shunk, and on Shunk from Weccacoe westwardly
4.) York from Aramingo to Emerald (appropriation insufficient to complete)
5.) Thomas Run extension on Frazier from terminus at Whitby to Willows and on Willows to 57th on 57th to Florence, and on Florence to Cobbs Creek (appropriation insufficient to complete)

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6.) Extension of Branch of Merion creek sewer through private property from terminus near Overbrook to City
7.) Orthodox from Delaware River to Richmond (appropriation insufficient to complete)
8.) Extension of East Branch of Wingohocken (Wingohocking) Creek on Stenton from terminus near Cora to Anderson to Charles and on Anderson northwest to Creek
9.) Extension of Pratt from present terminus at Willow to Charles (appropriation insufficient to complete)
10.) Extension of Cohocksink relief system on Mascher from Girard to Thompson
11.) Extension of Thomas Run sewer in Conestoga from South to Pine

C. In addition to the above, the sum of $50,000 was apportioned by Ordinance of December 31, 1900 for the extension of McKean relief sewer, from Swanson westwardly, to which was added the sum $8,000 by Ordinance
D.

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I. Bureau of Surveys
   A. Drainage in 1st, 26th, 36th, and 39th Wards
   B. Rapidity with which new buildings have been constructed has made it necessary to build large sewers on various parallel streets
   C. Work on McKean street sewer, designed to accomplish this purpose, has been prosecuted for several years, until construction has been completed between Delaware River and 12th
   D. Frankford Intercepting System--large and costly, but beneficial results
   E. Abolish Little Tacony creek by intercepting flow to the North and carrying it into Frankford creek, near its mouth
   F. Diversion of flow will permit construction of an intercepting sewer and ultimate opening of Torresdale Ave.

Pg.24

   G. Branch Sewers and Inlets- 21.499 miles of branch sewers at public expense, $423,549.84
   H. Total length of all sewers built and inspected during 1904- 29.75
   I. Parks and Parkways- movement to increase park areas of the City and to establish system of connecting boulevards
   J. Philadelphia has natural advantages for work of this character

Pg.27

II. Improvement of Channel of Schuylkill River
   A. During past year, 380,400 cubic yards other than rock or wreckage and 25.51 cubic yards of large boulders removed from channel of Schuylkill

III. Removing the wreck of S.S. “Bermuda”
   A. August 15, 1900, S.S. “Bermuda” sunk in the dock adjacent to Pier No.19, North Wharves
   B. She was abandoned in October, 1901
   C. December 31, 1903, Councils made an appropriation to remove this obstruction to commerce, work is progressing

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Pg.69

IV. Main Sewers
   A. Amounts appropriated for construction of main sewers during 1904
      1.) Ordinance approved June 27, 1904 for main sewers- $700,000
      2.) Ordinance approved December 31, 1903 for reconstruction and relief of the Cohocksink main sewer, $50,000
      3.) Reappropriated for sewer in Market street, $100,000
      4.) $700,000 appropriated by ordinance of June 27, 1904

a.) Extension of McKean street relief sewer from terminus at 12th to Broad
b.) Extension of Shunk street system on Porter street, from terminus at Stone House lane to Moyamensing Ave.
c.) Extension of Frankford intercepting sewer on Wakeling street, from terminus north of Tacony street to stream north of Cottage street
d.) Reconstruction of sewer in Girard Ave., from Mascher street to Front street, thence south on Front to Wildley
e.) Extension of Ogontz Ave., from terminus at Olney Ave. to drainage street north of Chew street
f.) Extension of Pratt street sewer, from terminus near Leiper street to Saul street, thence on Saul to Foust, north on Foust to Oakland, and east on Oakland to stream
g.) Extension of Magee street sewer, from terminus west of Delaware Ave. to a point near the bulkhead line, and from terminus at Milnor street west to Jackson
h.) Wissahickon high level intercepting sewer cut-off, beginning at 24th and Indiana, on 24th, to Allegheny, thence through private property along line of 24th extended to Westmoreland street

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i.) 60th, from Cobbs creek to Trinity, thence on Trinity to 59th, south on 59th to Chester
j.) 12th street relief sewer, from Lombard to Locust
k.) Extension of Jackson street, from terminus about 354 feet west of Schuylkill Ave. to 36th
l.) Castor road, from terminus northeast of Harrison to Pratt, thence on Pratt to Summerdale, and on Summerdale to Sanger
m.) Extension of Wingohocking creek on Ansbury, from terminus near 6th to North Penn Railroad
n.) Rock Run sewer on Ashdale street, from Philadelphia, Newtown and New York Railroad to Fairhill street
o.) Eastwick Ave., from 64th to 60th, and north on 60th to Gibson
p.) Branch of Rock Run sewer on Duncannon, from stream at Kensington and Oxford turnpike to "A" street; thence on "A" street to Fisher, on Fisher Ave., to Ella street, on Ella to Tabor
q.) Branch of Indian Run sewer on Lebanon Ave., form Indian Run, near 69th, to 66th
r.) 9th, from Courtland to Wyoming, thence on Wyoming to 11th, north on 11th to Louden, thence on Louden to 12th, and north on 12th to Ruscomb
s.) Extension of Luzerne, through grounds of Municipal Hospital, from present terminus to a point near Wingohocking creek

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B. Detailed statement of work on above main sewers

1.) Castor road, from northeast of Harrison to Pratt, thence on Pratt to Summerdale, thence on Summerdale to Sanger
2.) Eastwick Ave., from 64th to 60th, on 60th, from Eastwick to Gibson
3.) Indian Run sewer in 66th, from City Ave. to Sherwood, and 68th, thence to Malvern, and on Malvern to the creek at 69th

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4.) Indian Run sewer, branch on Lebanon Ave., from Indian Run near 69th to 66th
5.) Princeton street, from Hegerman street to the northwest side of Torresdale
6.) 60th, from Cobbs' creek to Trinity, on Trinity to 59th, on 59th to Chester
7.) 12th, from Lombard to Locust

V. Intercepting System

A. Most important work accomplished on intercepting system was completion of the sewer

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B. Work continued upon the extension of Cresheim creek intercepting sewer and upon Dobson's run intercepting sewer in 30th, from Scott's run to Allegheny, and on Allegheny, from 33rd to 29th
C. Rapid advance of building in the Manayunk territory and the Falls of Schuylkill makes it necessary to provide adequate means of drainage for improvements
D. Effect of this building expansion has been to place a greater duty upon main intercepting sewer than it was designed to perform
E. When being constructed, Department had in view an ultimate relief system to remove any pollution of the water supply

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F. Work upon this relief system was inaugurated by commencement of Wissahickon high level cut-off sewer
G. Extension of this system is required to reach the West Side of Chestnut Hill from the present terminus along the Wissahickon creek to Rex Ave.
H. Upon construction of intercepting sewer north of Nixon's Mills under the power canal there was constructed an inverted siphon, which is the first time a construction of this kind was introduced into a sewerage system of the City

Pg.75

I. Detailed report of work of construction upon sewers in the intercepting system
    1.) Cresheim creek intercepting sewer on Germantown Ave., from Cresheim creek to Moreland Ave., and on Moreland, from Germantown to a proposed drainage street
    2.) Dobson's run sewer, in 33rd, from Scott's to Allegheny, and on Allegheny, from 33rd to 29th
    3.) Intercepting sewer (main stem) extension, from terminus at Nixon's Mills, northeast of Fountain street, on private property to Shawmount [sic: Shawmont], and on Shawmount to Eva

Pg.76

VI. Wingohocking Creek System

A. Practical completion of west branch which receives the drainage from the most closely built up portion of Germantown
B. Section of this sewer was completed from the point of junction with main stem near Fisher's lane to Olney
C. Appropriations also made to extend sewer north from Olney to 21st, the terminus of the sewer formerly constructed to the north

Pg.77

D. Extension made to main stem of Wingohocking creek sewer, from a point west of 7th to a point west of 6th
E. Section of Luzerne street sewer, from a point east of 2nd through property purchased by the City for the site of the Municipal Hospital was completed
F. Near future, City will extend east branch of Wingohocking sewer from its present terminus north of Haines street
G. Detailed statement of construction work accomplished on this system during the year
    1.) Luzerne street, from east of 2nd northeast to Wingohocking creek
    2.) Luzerne street sewer extension through Municipal Hospital grounds to Wingohocking creek
    3.) Wingohocking creek sewer extension (east branch) on Ogontz, from 18th and Bellfield to Olney

Pg.78

    4.) Wingohocking creek sewer on Annsbury, from 6th to North Penn Railroad

VII. Drainage in the 1st, 26th, 36th, and 39th Wards
A. Sewer on McKean street was completed between Delaware river and 12th
B. Construction now underway between 12th and Broad
C. Work upon Shunk street system was continued to a point near Front and Porter

Pg.79

D. Work is under construction for a portion of the sewer on Porter, between Front and Moyamensing, which will practically complete the main sewer
E. Work which had been completed on Jackson, beginning at the Schuylkill river was continued, the existing contract extending from the terminus of the present sewer west of the Schuylkill river to 36th
F. Additional appropriation will be required to extend this sewer east and north to the built-up sections in the vicinity of 29th and Morris
G. Jackson, from 354 feet west of Schuylkill Ave. to 36th
H. McKean, from 9th to 12th
I. McKean, from 12th to Broad
J. Shunk street sewer system extension on Shunk, from west of Shelby to Front, on Front to Porter, on Porter west

Pg.80

K. Shunk street sewer system extension on Porter, from Stone House lane to Moyamensing Ave.

VIII. Frankford Intercepting System

A. One of the most important of the larger sewerage systems which receives attention of the Department is that upon which depends the placing of Frankford and vicinity in the enjoyment of sanitary conveniences equal to that of other sections of the City

B. The project is to abolish Little Tacony creek

C. Completion of this system will necessitate the construction of a large intercepting sewer along Wheatsheaf lane and also an intercepting sewer along the line of Frankford creek emptying into the Wheatsheaf lane sewer

Pg.81

D. Importance of this system is extending the main intercepting sewer and connections to preserve the purity of water supply

E. Contracts entered into for extension of large sewer on Wakeling street, from Tacony to Ditman, and proposals for extending the sewer now terminating on Pratt street northwest of Frankford to Dark Run lane and Oakland

F. Detailed statement of work completed

1.) Frankford intercepting sewer system on Wakeling, from Frankford creek northwest

2.) Frankford intercepting sewer system on Wakeling, from north of Tacony to Ditman

3.) Pratt, from Frankford northwest

Pg.82

IX. Aramingo System

A. Reconstructed sewer on York street, from American to 5th, and on 5th, from York to Cumberland

B. Most important sewer built within this system is that of a relief sewer on Edgemont, from Lehigh to York, and on York west

C. Formerly overflows of property occurred at every heavy rain storm, but since construction of York street relief system, the difficulty has been obviated

D. Detailed statement of work

1.) York, from American to 5th, on 5th, from York to Cumberland

X. Cohocksink System

A. Improve old sewers, reconstruct large sewer in Montgomery, between 6th and Marshall

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B. Separate contract entered into for work of reconstruction

C. November, serious break occurred in old sewer at intersection of Lawrence and Thompson

D. Examinations made of the interior of this old sewer at various times, notably on Montgomery, 6th to Randolph, and on Randolph, from Montgomery to Columbia, and on Dauphin, between Broad and Park, at all which points the sewer is in a dangerous condition

E. Portion of sewer on Girard, from Mascher to Front, and on Front south to near Wildey, is to reconstructed

Pg.84

F. Detailed report of work performed

1.) Cohocksink sewer relief and reconstruction on Montgomery, from east of Marshall to 24 feet east of East Side of 9th

2.) Cohocksink relief sewer on Germantown, from Montgomery to Berks, on Berks, from Germantown to 9th

Pg.85

XI. Rock Run System

A. To the North of Wingohocking area, between it and the County Line, in the vicinity of Oak lane, there has been projected a system of drainage of considerable extent passing along the streets adjacent to a stream known as Rock run, emptying into the Frankford creek immediately east of the Kensington and Oxford turnpike, and extending through the upper portion of the 42nd Ward

B. The City has authorized beginning of work to construct sewer in Ashdale, from Philadelphia, Newtown and New York Railroad to Fairhill

C. Also construction of a branch in this Rock run sewer on line of Duncannon, from stream at Kensington and Oxford turnpike to "A" street, thence on "A" to Fisher, on Fisher to Ella, on Ella to Tabor

Pg.86

XII. Reconstruction of Sewers in Connection with the Subway on Market Street

A. Market Street Subway of the Philadelphia Rapid Transit Company required the revision of the sewer system in the territory affected

B. Work completed is as follows

1.) South side of Market, from East Side of 21st to a point 270 feet East of 17th

XIII. Remarks upon Improved Sanitation

A. Rapid increase in urban population in each decade serves to fix attention of municipal authorities upon possible needs of the community at the end of three decades, with a view to making all present projects conform to these requirements

B. Present need of the City is for extension of systems of drainage

Pg.87

C. At present the volume of flow in the Delaware River is so great as to give rise to no complaint concerning the discharge of City sewers into it

D. Complaints of the Schuylkill have arisen, and a tentative plan for intercepting the sewers emptying into that river has been provided

E. The occasional breaking of old sewers is due to sewers wearing out, but should not be used as an argument for decrying the whole sewer system

Pg.88

XIV. Main Sewers Required

A. List of main sewers needed for the proper development of the City, not in order of importance

1.) McKean street extension on Broad

2.) Pratt street extension

3.) Magee street extension

4.) Wakeling street extension

5.) Devereaux street, from Hegerman street to Lardner and Tacony

6.) Thomas run, from 57th and Florence to 53rd and Hadfield
7.) Extension, from 63rd and Market to Cobbs creek
8.) McKean street relief on 13th, from McKean to Morris
9.) Extension of Jackson
10.) 52nd street extension to Chester branch P. &R. Railway
11.) East branch Wingohocking north of Haines
12.) Wissahickon high level cut-off
13.) Wissahickon extension to Rex
14.) Rock Run extension
15.) Tioga, from Delaware River west
16.) Indiana Avenue relief

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17.) Botanic creek extension
18.) Reconstruction, 42nd, from Haverford to Powelton
19.) Reconstruction, Christian, from Taney to 21st
20.) Snyder to low water
21.) Janney, from Allegheny to Westmoreland
22.) Porter to Delaware
23.) Wheatsheaf lane intercepting sewer
24.) Torresdale intercepting sewer
25.) 9th, Butler, and 10th, from Tioga to Luzerne
26.) Creshheim intercepting extension

XV. Branch Sewers and Inlets

A. $20,000 appropriated for branch sewers and inlets
B. $5,000 appropriated for reconstruction of inlets

Pg.90

XVI. Summary of Work upon Sewers

A. Total number of main sewers under construction was 26, some were carried over from last year

XVII. Sewer Connections and Records

A. Sewer connections of 6,078 buildings were authorized during the year, which involved issuing 3,155 permits

Pg.92

B. 418 drains were connected with the Manayunk intercepting sewer and its branches
C. 267 plans of main and branch sewers were received from District Surveyors

Pg.93

XVIII. General Plans for Improvement

A. Planned improvements include both special and general engineering problems involving the revision and extension of the street system throughout the City

Tables

A. Pg.80- Frankford Intercepting System Main Sewer in Wakeling Street from terminus north of Tacony street to Ditman
B. Pg.82- Junction Chamber for main sewer in Pratt St. Saul St. and Foust St. from Present terminus near Leiper to Oakland
C. Pg.86- Main Sewerage Systems of the City of Philadelphia

LIST OF TABLES INCOMPLETE

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Pg.54-70, 77-80, 91-93, 107-160

Pg.54

I. Main Sewers
   A. Two important works properly classes as maintenance
      1.) for reconstruction and relief of the Cohocksink sewer, $50,000
      2.) for repairs and improvement of old sewers, $15,000
   B. Appropriation of $700,000 in July, 1904 for purpose of constructing main sewers
   C. All main sewers authorized had been placed under contract, with exception of Ogontz Avenue
   D. Construction of a deep sewer in Market street planned
   E. Detailed statement of work performed on main sewers authorized and placed under construction

Pg.55

      1.) Castor road, from northeast of Harrison to Pratt, thence in Pratt to Summerdale, then in Summerdale to Sanger, $22,944.00
      2.) Eastwick, from 64th to 60th, from Eastwick to Gibson, $23,029.74
      3.) Indian Run sewer, branch in Lebanon from Indian Run near 69th to east of 67th, $12,000
      4.) Magee street extension from west of Delaware to a point near Bulkhead line and from Milnor street west to Torresdale, $37,576

Pg.56

      5.) Rock Run sewer in Ashdale, from the P.N.&N.Y.R.R. to 5th, $31,000
      6.) 60th, from Cobb's creek to Trinity in Trinity, from 60th to 59th, and in 59th, from Trinity to Chester Ave., $17,709.54
      7.) 12th from Lombard to Locust, $18,009.01

II. Intercepting System
   A. Real estate improvements, in Manayunk and the Falls of Schuylkill make it incumbent upon the City to provide adequate means of drainage so as not to retard this development

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   B. Main Intercepting sewer has been performing a greater duty than it was designed for
   C. Construction has begun
      1.) Wissahickon High Level sewer along the Wissahickon creek, from above Hartwell Ave. to Rex Ave., the Cresheim creek intercepting sewer, from Moreland, north along a drainage street to Willow Grove, to 25th, to Hartwell, to stream east of 25th
      2.) Pollution of inland streams and need for drainage into nearest outlet has present number of problems

3.) Solution is to provide intercepting sewers along the more important streams, to collect drainage and discharge it. Examples are Cobb's creek and Frankford creek

Pg.58

4.) Detailed report of construction carried on within intercepting system
5.) Wissahickon High Level cut off sewer in 24th and through private property along line of 24th from Indiana street to the P.G.&N.R.R., $18,679.68

III. Wingohocking Creek System

A. System is so large that scarcely a year passes without something done upon the extension of one of them
B. Extensions are required to meet demands of building improvement
C. During the present year, and extension was made to the main stem of the Wingohocking creek sewer in Annsbury street, from the terminus near 6th to the North Penn railroad

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D. Another branch to the Wingohocking creek sewer was constructed in 9th, from Courtland to Wyoming, to 11th, to Louden, to 12th, to Ruscomb, $17,068.80
E. Wingohocking creek sewer in Annsbury, from near 6th to the North Penn railroad, $15,040

IV. Drainage in the Southern Section of the City

A. Necessity for providing houses to meet the growth of population has brought property in the south section of the City into great demand (accessible from business center of City)
B. Availability of this land is dependent upon City providing means for drainage

Pg.60

C. Several sewer systems are under construction or projected to meet these demands, among them being the McKean street relief sewer, between Swanson and Broad,
D. The sewer should be extended from its present terminus, on Broad street, to Mifflin street, thence west and north to 16th and Tasker
E. Work upon sewer in Porter, from Front to Moyamensing was carried to completion, and addition to this sewer will be the extension of the main outlet along the line of Porter street, from Front to Delaware river
F. The work of constructing the main sewer in Jackson street, west of the Schuylkill river was continued, but additional appropriations must be made before this system can become effective, it must be extended from 36th to 29th and north no the latter street to Morris
G. Construction work of the year
    1.) Jackson street, from 354 feet west of the Schuylkill Ave. to 36th, $19,860.37
    2.) McKean street, from 12th to Broad, $23,253.76

Pg.61

3.) Shunk street sewer system, extension in Porter from Stone House lane to Moyamensing Ave., $68,792.92

V. Frankford Intercepting System

A. Frankford Intercepting System is one of most comprehensive in the City
B. Object is the restoration of the Frankford creek to a sanitary condition
C. Diverts the flow of the Little Tacony creek from the natural channel into the Frankford creek
D. This work will be followed by the construction of a large sewer in Wheat Sheaf lane, from the Delaware river to Frankford Ave., and thence along Frankford creek to its junction with the Wingohocking creek
E. An intercepting sewer to gather drainage from existing sewers is intended to be constructed along Frankford creek, allowing only storm water to find its way into Frankford creek

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F. Work has been continued on the large sewer in Wakeling from Tacony to Ditman, and on the upper end of the system on Pratt, Saul, and Foust to Oakland
G. Detailed statement
    1.) Frankford Intercepting Sewer System in Wakeling, from north of Tacony to Ditman, $27,304.80
    2.) Pratt street sewer extension, from near Leiper to Saul, in Saul to Foust, in Foust to Oakland and east in Oakland to stream, $26,515.20

VI. Cohocksink System

A. Appropriated work of reconstructing worn out portions of the Cohocksink sewer, $50,000
B. Funds have been expended in the total reconstruction of the sewer on Dauphin street, between 12th and Broad

Pg.63

C. With funds provided from the sewer loan of 1904, the portion of the sewer in Front, from Wildey to Girard, and in Girard, from Front to Mascher was reconstructed
D. Examinations along the line of this system show the necessity of reconstructing those portions in Montgomery Ave., from 6th to Randolph, and in Randolph, from Montgomery to Columbia
E. Appropriated for the repairs, reconstruction, and improvement of old sewers, $15,000, which was applied principally to reconstructing sewer in Mascher, north of Thompson
F. Section of Cohocksink sewer in Thompson, between Lawrence and 5th, begun in 1904, was also completed
G. Detailed statement
    1.) Cohocksink sewer relief and reconstruction in Girard, from Mascher to Front, and in Front, from Girard to a point near Wildey, $35,127.17

Pg.64

    2.) Cohocksink sewer reconstruction and relief in Montgomery Ave., from east side of Marshall to 24 feet east of 9th, $49,895.02
    3.) Cohocksink sewer reconstruction and relief in Dauphin, from 12th to Broad, $32,319.06
    4.) Repairs, reconstruction and improvement of old sewers, under the general contract for 1904

5.) Work done under this contract during 1905 consisted in the reconstruction of Cohocksink sewer in Thompson at Lawrence where a break occurred on November 14, 1904, $4,859.07

Pg.65

6.) Repairs, reconstruction, and improvement of old sewers under the general contract for 1905, work was prosecuted at the following locations
    a.) Reconstruction of the Cohocksink sewer in Thompson, from west of Lawrence to east of 5th, $5,100.96
    b.) Construction of well-hole and connections thereto at the northeast corner of Tasker and 9th and miscellaneous work upon manholes along the line of Cohocksink sewer, $340.74
    c.) Rectification of channel of the Frankford creek at Powder Mill lane, $238.90
    d.) Reconstruction of Mascher street branch of Cohocksink sewer, from Thompson north, $9,319.25
    e.) Total cost of all work done under this contract during the year was $14, 999.85

VII. Market Street Subway Sewers
- A. Construction and reconstruction of sewers in connections with Market street subway was continued during the year, east of 17th
- B. Embraced the construction of the diversion sewer in Mole, Ranstead, and 15th streets, south of Market, between 15th and 16th

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- C. Work and inspection were without cost to the City

VIII. The State Department of Health
- A. An Act of Assembly of the State of Pennsylvania, created a Department of Health, and provided for the appointment by the Governor of a Commissioner of Health
- B. On of the duties of the Commissioner and of municipalities
    1.) Sect.6: report a sewer system, which comprises facts and information as the Commissioner requires, no sewer system is exempt

Pg.67

- C. Plans of sewerage systems of the City were filed in accordance with this act on October 2, 1905
- D. Act gives Commissioner power over all the waters of the State
- E. the effect of the act may entail great expense upon municipalities, but will improve sanitary conditions of streams

IX. Branch Sewers and Inlets
- A. There was appropriated for branch sewers and inlets, $175,000
- B. Number of new contracts drawn for branch sewers was 127
- C. 155 contracts completed
- D. 19.577 miles of branch sewers constructed at public expense
- E. $5,000 appropriated for reconstruction of inlets
- F. contracts were entered into for construction and reconstruction of inlets, curbing, laterals, manholes, etc., $25,554.83

Pg.68

G. work accomplished the construction and reconstruction of 211 inlets

X. Summary of Work Upon Sewers

A. Total number of main sewers under construction, some of which were carried over from last year, was 21

B. Total length of all sewers built and inspected was 32.473 miles

XI. Sewer Connections and Railroads

A. Sewer connections of 8,778 buildings were authorized during the year, 2,962 permits

Pg.70

B. 511 drains were connected with Manayunk Intercepting sewer and its branches, inspected by the supervisors of the Intercepting Sewer

C. 304 plans of main and branch sewers received from the District Surveyors

D. 22 plans of lateral pipes put in old sewers were also returned

E. Indexing of Inspectors' books have been continued, number received during the year was 256, total now in use is 6,767

F. All moneys paid at office of Receiver of Taxes

XII. Graphs

A. Pictures

1.) Pg.62- Sewer Section at Pratt and Saul Streets, 12 Feet, 9 Inches Diameter

B. Diagrams

1.) Pg.54- Main Sewerage Systems of the City of Philadelphia

2.) Pg.56- Rock Run Sewer in Ashdale Street from Philadelphia, Newtown, and New York R.R. to 5th

3.) Pg.64- Sheet No.1, Reconstruction of Cohocksink sewer in Girard Ave. from Mascher to Front thence south on Front to a point near Wildley

4.) Diagram Showing Length of Completed Sewers- Main and Branch

Pg.77-80

Pg.77

XIII. Rainfall, Discharge, and Tide Observations

A. Interesting too note the differences in the amounts of the monthly rainfall in different sections of the City

B. Average precipitation for the year in all parts of the city is 39.85 inches

C. U.S. Weather Bureau gives the average for the year 41.61 inches

D. Neighborhood of 9th and Berks, which was usually flooded, was free from flooding (Berks street sewer was finished, relieving the Norris and 9th sewers)

Pg.78

E. High tide lower than usual mean- 2.54

F. Mean low tide- 7.40

G. Between Dec.5 to Dec.10 high tide was 5.71 and low tide was 7.26, a variation of only 1.55 feet, which is rare

H. First 3 months of year were extremely cold, accumulated deficiency in temperature on March 1 was 25 degrees- no tides recorded during this period

XIV. Graphs

A. Pg.79- Diagram of Tides for 1905 at Arch Street Pier
B. Pg.79- Rainfall (in Inches) in City of Philadelphia during 1905
C. Pg.80- Details of Most Severe Storms

Pg.91-93

Pg.91

XV. Improvement of the Channel of the Delaware River
   A. Last work done under the City of Philadelphia toward improving the channel of the Delaware River, consisted in the formation of a channel 26 feet deep t a mean low water and 600 feet wide through shoals along Tinicum Island range, complete in 1902

Pg.92

   B. Necessity of having deep water channel brought up to the City and the lack of further appropriations by the U.S. to this end caused this to be brought to attention of State Legislature and resulted in Act of Assembly, May 8,1905, $375,000
   C. Plans of work submitted by his Honor, the Mayor, to the Secretary of War, with request that City be allowed to proceed
   D. License was granted by Secretary of War, October 23, 1905
   E. Formation of a channel 30 feet deep and 600 feet wide
   F. Work divided into 5 sections

XVI. Map- Pg.92, Map of the Delaware River Showing Sites of the Dredging for the Proposed 30-foot Channel by the City of Philadelphia

Pg.93

XVII. Removal of the Wreck of the Steamship Bermuda
   A. Work on the removal of this wreck to resume in early Spring, but then abandoned by its contractor, Lewis H. Darling
   B. Work on the contract is still underway

Pg.107-160

XVIII. Tables
   A. Pg.107-109- Main Sewers
   B. Pg.110-114- Length and Cost of Main Sewers Built During the Year 1905
   C. Pg.115-116– General Statement of Work Done by District Surveyors During the Year 1905
   D. Pg.117-119- Branch Sewers
   E. Pg.120- Summarized Statement of Branch Sewers Built During the year 1905
   F. Pg.121- Statement of Inlets Built with and without Grate Tops, Inlets Rebuilt, Removed and Rebuilt at Other Places, Curved Granite Curb, Sewer Spurs, Masonry, etc., in Connection with Old Sewers, During the Year 1905
   G. Pg.122-160- Length and Cost of Branch Sewers Built during the Year 1905

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(Incomplete: see also p 94, 105-150)

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Pg.50

I. Main Sewers
   A. Appropriations for main sewers, $404,000
   B. $30,000 for repair and improvement of old sewers
   C. sewers were urgently needed

Pg.51

   D. December 6th, "Resolution to publish 'An Ordinance to authorize the negotiation of the loan'", allows City to build many main sewers which have been considered important in developing the City
   E. Detailed sewer of work on main sewers
      1.) Castor Road from northeast of Harrison street to Pratt street, thence in Pratt street to Summerdale street, thence in Summerdale street to Sanger street, $7,479.71
      2.) Magee street extension from west of Delaware Ave. to a point near the Bulkhead line; and from Milnor street west to Torresdale Ave., $65,585.52

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      3.) Market street sewer reconstruction from 33rd to 36th, and in 33rd from Market street south about 40 feet, $20,000
      4.) Rising Sun from Hutchinson street to 9th, in 9th from Rising Sun to Erie, $15,000
      5.) Rock Run Sewer in Ashdale street from P.N.&N.Y.R.R. to 5th, $47,834.58

Pg.53

      6.) Thomas Run System in Florence from 57th to 54th, in 54th from Florence to Willows, in Willows from 54th to 53rd, in 53rd from Willows to the line of Hadfield street, and thence along line of Hadfield street across private property to present sewer at the W.C. and Phila.R.R., $20,000

II. Intercepting System
   A. Bureau has given its attention largely to the planning of drainage systems to improve the sanitary condition of the larger streams within the City which have become polluted
   B. Act of Assembly has given the State large powers to preserve purity of waters of the State
   C. City has endeavored to keep pollution from Wissahickon creek, its tributaries, and the Schuylkill River

Pg.54

D. Intercepting system along Cobb's creek is projected
E. Work on all intercepting sewers is urgent
F. Detailed report of construction
    1.) Wissahickon High Level cut-off sewer in 24th street, and through private property along the line of 24th street from Indiana street to the P.G. and N.R.P., $25,074.60

Pg.55

    2.) Wissahickon High Level Intercepting sewer cut off across private property in line of 24th and in Stokley from present terminus at Norristown Branch of the P. and R. Ry. To Richmond Branch of the P. and R. Ry., $35,000
    3.) Wissahickon Low Level Intercepting sewer along the Wissahickon creek through Park property, from a point south of Rittenhouse lane, $50,000
    4.) Cresheim Creek Intercepting Sewer System in proposed drainage street from Moreland to Willow Grove, $15,000
    5.) Cobb's Creek Intercepting Sewer, on the line 75th street, from Cobb's creek to Gray's Ave., in Gray's, from 75th to Island, in Island, from Gray's to Woodland, thence on the east side of Cobb's creek through opened and unopened streets, and through private property from Woodland north, $75,000

Pg.56

    6.) Frankford Intercepting Sewer System in Wakeling from north of Tacony to Ditman, $66,960
    7.) Frankford Intercepting Sewer System in Wakeling from Ditman to Cottage, $40,000

Pg.57

    8.) Pratt street sewer extension from near Leiper to Saul, in Saul to Foust to Oakland, and east in Oakland to stream, $77,916.99

III. Wingohocking Creek System

A. Wingohocking Creek System is intimately connected with the Frankford Creek System
B. Flow of sewage from this territory enters Frankford creek, and must be diverted through other channels into the Delaware River before Frankford creek can be relieved from its present pollution
C. Work placed under contract for new extensions
    1.) Extension of sewer in Ogontz Ave., from terminus at Olney Ave. to drainage street north of Chew street, $20,203.30

Pg.58

    2.) 9th, from Courtland to Wyoming, in Wyoming from 9th to 11th, in 11th, from Wyoming to Louden, and in Louden from 11th to 12th, $22,418.23

IV. Drainage in the Southern Section of the City

A. Work upon the McKean street relief sewer was carried almost to completion

B. As opening of streets and number of buildings in this territory are multiplied, demands are made upon the bureau for drainage
C. To provide drainage, main sewer must be built in Shunk, from Front to Broad
D. Southwestern section of City, 4,000 acres of lowland presents a serious drainage problem

Pg.59

E. Work accomplished
    1.) Jackson street sewer extension, from present terminus at 36th, eastward to 32nd, $30,000
    2.) McKean street relief sewer, in Broad, from McKean to Mifflin , in Mifflin from Broad to Rosewood, in Rosewood from Mifflin to Moore, in Moore from Rosewood to Hicks, in Hicks from Moore to Tasker, and in Tasker from Hicks to 16th, $25,000

V. Cohocksink System
A. Appropriated for reconstruction of portions of Cohocksink sewer by Ordinance of December 26, 1905, $25,000
B. Utilize $10,000 for completion of work under construction in Dauphin between 12th and Broad
C. $15,000 used for reconstructing sewer in Thompson, between 5th and Randolph

Pg.60

D. Sewer unstable at Montgomery, from 6th to Randolph, and in Randolph, from Montgomery to Columbia
E. Ordinance of December 26, 1905, $15,000 for repair and improvement of old sewers, applied in the main to the reconstruction of sewer in Mascher street, from north of Thompson street to north of Master street
F. Ordinance of May 22, 1906 carried appropriation for old sewers of $15,000, utilized for reconstruction of sewers through Commercial Museum Grounds in West Philadelphia
G. Pennsylvania Railroad Company arranged to build and pay for part of sewer under its tracks, City bearing expense of portion between railroad property and west bank of Schuylkill
    1.) Cohocksink sewer reconstruction and relief in Thompson, from 5th to Randolph, $8,124.56

Pg.61

    2.) Cohocksink sewer reconstruction and relief in Dauphin, from 12th to Broad, $67,507.25

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VI. Reconstruction of Old Sewer Through Commercial Museum Grounds and Other Property West of Schuylkill River
A. Work in progress, portion of sewer will be built at cost of Pennsylvania Railroad Company

VII. Market Street Subway Sewers
A. Sewers constructed by Philadelphia Rapid Transit Company
    1.) Market, between Delaware and Front
    2.) Market, between Front and 8th

3.) South side of Market, from east of 15th to Broad, and in Broad southward of Market

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VIII. The State Department of Health
- A. In compliance with the Act of Assemble of April 22, 1905, The Bureau forwarded to Harrisburg a plan showing the existing sewer systems in the city
- B. Discussion as to the best means of securing a practical compliance therewith
- C. Willingness of the City to work in harmony with the Department to secure results aimed at by the Act
- D. Plans for disposition of sewage are so complex that they can be considered a separate proposition from maintenance of drainage facilities, and the extension of the existing systems

IX. Branch Sewers and Inlets
- A. Number of new contracts drawn for branch sewers was 137
- B. 11 contracts completed
- C. 15.664 miles of branch sewers completed at public expense
- D. total expense- $355,677.62
- E. Appropriated for reconstruction of inlets, $5,000
- F. Construction of inlets, curbing, laterals, manholes, etc., $15,000

Pg.65

X. Summary of Work Upon Sewers
- A. Total number of main sewers under construction, 21- 2 were intercepting system
- B. Total length- 25.046 miles

XI. Sewer Connections and Records
- A. Sewer connections of 10,530 buildings were authorized during the year, 3,152 permits issued

Pg.66

- B. 483 drains were connected with Manayunk Intercepting Sewer and its branches

XII. Graphs
- A. Pg.50- Main Sewerage Systems of the City of Philadelphia
- B. Pg.64- Diagram Showing Length of Completed Sewers
  1.) Main sewers
  2.) Branch Sewers

Pg.83-87

Pg.83

I. Rainfall, Discharge and Tidal Observations
- A. Average precipitation in all parts of the city is 53.65 inches
- B. U.S. Weather Bureau gives to the average for the year 51.87 inches
- C. Rainfall this year was outcome of long continued storms, with few severe storms
- D. Most severe storms
  1.) June 16th
  2.) July 3rd
  3.) August 3rd

E. Longest continuous rain happened on April 8th and 9th, 24 hours

Pg.84

F. Tidal observations were continued at Arch Street Pier
G. High ides registered lower than last year
H. Mean high tide- 2.60
I. Mean low tide- 7.66
J. Mean high tide for past 7 years- 2.39
K. Mean low tide for same period- 7.55
L. Variation of tides for last 7 years is 5.16 feet, established variation is 6.27 ft
M. During months of January, February, and part of March the recording float was frozen and no record could be obtained

II. Graphs

A. Pg.85- Rainfall (in Inches) in City of Philadelphia during 1906
B. Pg.86- Details of Most Severe Storms
C. Pg.86- Relations between Intensity and Duration of Rainfall as shown by Pluviometer Records
D. Pg.87- Intensities of Rainfall and Maximum Flow in Sewer, 13 ft., 0 in. Diam., 7th Survey District

Pg.89-94

Pg.89

I. The Improvement of the Channel of the Delaware River

A. Act of Assembly of May 8, 1905, $375,000 for Deepening and Improving the Channel of the Delaware river between the City of Philadelphia and Delaware bay
B. Act completed in order to satisfy public demand that channel completed ASAP
C. This sum limited the deposit of material dredged from the channel to the State of Pennsylvania
D. After rejection of proposals, changes were made in the specifications to admit all methods of dredging

Pg.90

E. Single proposal received on June 14th covered but two of the five sections into which the work was divided, it was rejected
F. Considerable agitation and discussion arose as to great advisability of depositing the dredgings in the State of Pennsylvania only

Pg.91

G. Proposals received from four parties were for tracts in accessible to the Government plant, and were not accepted
H. New set of Dredging Specifications was prepared and advertised for proposals to be received August 15th
I. Lowest of the four bids was from the American Dredging Company, $430,400
J. Matter of award was held in abeyance and award made only after the passage of an ordinance on Oct.15th,1906

Pg.92

K. Contractors have been forming a basin for the reception of the dredged material on the New Jersey shore behind the lower end of Chester Island

L. The U.S. dredging plant was overhauled and put on the City's work, covering that portion of the river channel in front of Tinicum Island, also across Ft. Mifflin Bar and extending into the horse shoe to a point opposite Red Bank

M. On august 16th the grapple dredge "Hell Gate" was placed in position on Tinicum Island range

Pg.93

N. Paid by the City on account of Government work, for materials furnished and operating expenses, $61,361.60

II. Removal of the Wreck of the Steamship "Bermuda"

A. The wreck was sunk at Pier 10 North Wharves, on August 15th, 1900

B. The rate at which records are accumulating and the necessity of keeping them available for instant reference, requires the use of a system which has outgrown the space at the Bureau's disposal

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Pg.45-69

Pg.45

Main Sewers

A. $257,400 available for construction of main sewers

Pg.46

B. $193,000 apportioned among 9 sewers
C. Detailed summary of work on main sewers
   1.) Bingham sewer extension from Loudon to Wyoming, in Wyoming from Bingham to "B", $14,500
   2.) Market sewer reconstruction from 33rd to 36th, and in 33rf from Market south about 40 feet, $20,000

Pg.47

   3.) Market sewer reconstruction from present terminus east of 36th to 36th, $4,500
   4.) 9th sewer from Erie to Butler, in Butler to 10th, and in 10th from Butler to Luzerne, $25,000
   5.) Pine sewer (Schuylkill outlet) reconstruction, $25,000
   6.) Rising Sun from Hutchinson to 9th, in 9th from Rising Sun to Erie, $15,000

Pg.48

   7.) Thomas Run sewer system in Florence from 57th to 54th, in 54th from Florence to Willows, in Willows from 54th to 53rd, and in 53rd to line of Hadfield, $20,000
   8.) Thomas Run sewer system extension in Florence from present terminus near 55th to 54th, in 54th from Florence to Willows, in Willows from 54th to 53rd, in 53rd to line of Hadfield, and in line of Hadfield across private property to the West Chester and Philadelphia Railroad, $24,000

Pg.49

   9.) Whitaker from Rockland to Loudon, in Louden from Whitaker to Bingham, and in Bingham from Louden to Wyoming, $20,000
   10.) Reconstruction of old sewer through the Commercial Museum grounds and other private property west of the Schuylkill River, $15,000

Pg.50

I. Intercepting Systems
   A. Sufficient to construct a culvert over a stream or to enclose it in a conduit
   B. Now, as city spread, conduits were extended until they terminated at banks of bordering rivers
   C. Rendered unsanitary streams short distances away from built-up sections
   D. In order to preserve purity of streams, method of using intercepting sewers was later adopted, known as the Intercepting System, distinction from water carriage or combined system

Pg.51

E. Detailed report of construction carried on within the territory embracing the intercepting systems
   1.) Cresheim creek intercepting sewer in proposed drainage sewer from Moreland to Willow Grove, $15,000
   2.) Cobb's creek intercepting sewer on the line of 75th from Cobb's creek to Gray's, in Gray's from 75th to Island, in Island from Gray's to Woodland, thence on the east side of Cobb's creek through streets and through private property from Woodland North, $75,000
   3.) Frankford intercepting sewer in Wakeling from North of Tacony to Ditman, $93,000

Pg.52

   4.) Frankford intercepting sewer in Wakeling from Ditman to Cottage, $40,000
   5.) Wissahickon high level intercepting sewer cut-off across private property in line of 24th and in Stokley from present terminus at Norristown Branch of the P.&R.Ry. to the Richmond Branch of the P.&R.Ry., $35,000

Pg.53

   6.) Wissahickon high level intercepting sewer cut-off in Stokley from south of Hunting Park to Juniata, $50,000
   7.) Wissahickon low level intercepting sewer extension along Wissahickon creek and through Park property from the west bank of said creek at Rittenhouse north to Walnut lane, $50,000
   8.) Wissahickon low level intercepting sewer extension along the Wissahickon creek through Park property from a point south of Rittenhouse lane, $36,500

Pg.54

II. Wingohocking Creek System
   A. Extension of sewers in Wingohocking creek area has constituted a large proportion of the main sewer work
   B. Main item of importance is beginning work upon the Wheatsheaf lane intercepting sewer, which has a marked bearing upon future sanitary improvement of the Wingohocking creek, Frankford creek and rock run
   C. One extension in progress
      1.) 12th, from Louden to Ruscomb, $8,500

III. Cohocksink Sewer
   A. $25.000 for Cohocksink relief sewer
   B. $15,000 appropriated for repairs, reconstruction, and improvement of old sewers

Pg.55

   C. Description of work upon Cohocksink sewer
      1.) Cohocksink sewer reconstruction and relief in Thompson from 5th to Randolph and at other points
      2.) Repairs, reconstruction and improvement of old sewers
         a.) Reconstruction of the branch of Cohocksink sewer in Mascher from a point 177 feet north of Master to a point 110 feet north of Jefferson

b.) Reconstruction of Cohocksink sewer at the break, on Thompson at Leithgow

Pg.56

c.) Construction of miscellaneous repair work along line of Cohocksink sewer at various locations

IV. Drainage in the Southern Section of the City

A. Development of a large city follows the lines of least resistance
B. Value of land for urban development is directly proportional to its nearness to the centre of business
C. One of most urgent main sewers in this section is that proposed on Shunk street from Front to Broad

Pg.57

D. Continue work on the Jackson main sewer, discharging into the Schuylkill
E. Work upon McKean street relief sewer carried on for years, is now complete- resulting in giving satisfactory drainage in the territory affected
F. Work accomplished on sewers in southern section
   1.) Jackson sewer extension from 36th to 32nd, $30,000
   2.) Jackson sewer extension from 33rd to 29th, $30,000
   3.) McKean street relief sewer in Broad from McKean to Mifflin, in Mifflin from Broad and Rosewood, in Rosewood from Mifflin to Moore, in Moore, from Rosewood to Hicks, in Hicks from Moore to Tasker, in Tasker from Hicks to 16th, $25,000

Pg.58

V. Market Street Subway Sewers

A. Sewer work in connection with construction of Market street passenger railway subway has been in active progress
B. Sewer on south side of Market almost complete between Delaware river and 13th, and on north between Delaware river and 10th
C. Total length built is 8,162 lineal feet

Pg.59

VI. The State Department of Health

A. Harmony of action between the Bureau and the State Department of Health
B. Most important disposal works in the easterly portion of the country were visited and examined, and data was collected on subject of disposal;
C. Testing station near Spring Garden Pumping Station was transferred to Bureau of Surveys- it dismantled in part, and partially destroyed by fire
D. City to restore it to pump sewage from the intercepting sewer along East Park Drive to the station

Pg.60

E. Contracts made
   1.) Restoring burnt portion of the station, $3,000
   2.) Furnishing and erecting cast iron force main, $2,200

VII. Branch Sewers and Inlets

A. Ordinance for branch sewers and inlets, $5,000
B. Number of new contracts for branch sewers was 169, 150 contracts completed
C. 21.299 miles of branch sewers at public expense, $580,878.77

D. Ordinance for reconstruction of inlets, etc., 5,000

Pg.61

E. Contract for construction of inlets, curbing, laterals, manholes, etc., $20.000
F. Contract for reconstruction of inlets, $5,000
G. Work built 223 inlets, 2,390.72 feet of curbing, 5,598.00 linear feet of lateral sewer connections

VIII. Private Sewers

A. 75 contracts for construction of sewers at private cost under the City
B. 46,445 lineal feet, 8.797 miles of branch sewers

IX. Summary of Work Upon Sewers

A. Total number of main sewers under construction was 24
    1.) 8 intercepting sewers
    2.) 7 reconstruction

Pg.62

    3.) total length of all sewers built, 34.701 miles
B. All contracts executed have required use of Portland cement in all construction
C. Prior to 1907 Portland and natural cements were specified for various classes of work, particularly branch sewer construction

X. Sewer Connections and Records

A. Sewer connections of 11,001 buildings were authorized
B. 2,734 permits

Pg.64

C. 589 drains connected with Manayunk intercepting sewer and its branches
D. Bureau of Water, Highways and Health have been furnished with a daily list of all permits issued
E. 297 plans of main and branch sewers were received from District of Surveyors
F. 25 plans of lateral pipes put in old sewers were returned
G. Indexing of Inspectors' books has been continued
    1.) 249 received
    2.) 7,203 now in use
H. 3 inspectors of drain connections and two supervisors of Manayunk intercepting sewer have been on duty during the year
I. Receipts of the Bureau from all sources were $38,839.99

XI. Rainfall, Discharge and Tidal Observations

A. City has placed four stream gauges in different sections, and their utility and importance have been demonstrated so that more will be installed
B. Velocity of water corresponded to results given by Kutter's formula for flow of water in open and closed channels
C. Limitations of the accepted formulae for run-off in sewers has long been recognized by municipal engineers, and the need for a more accurate formula for application has been felt

Pg.66

D. Tidal observations were continued at Arch St. Pier
E. High tides were low, on account of prevailing westerly winds
F. Mean high tide is 2.25

G. Mean low tide is 8.52
H. New low water plane 7.50
I. Variation of tides for last 8 years is 5.10 feet, established variation is 6.27
J. Weather conditions have been variable
K. In March, temperatures in 90's, in April, snowstorm prevailed
L. Deficiency in temperature for the year was 276 degrees

XII. Graphs

A. Maps: Sewers/Systems
    1.) Pg.46- Main Sewerage Systems of the city of Philadelphia, total mileage of main sewers constructed and under contract: 177.69 miles

B. Tables/Diagrams
    1.) Pg.62- Diagram Showing Length of Completed Sewers
        a.) Year
        b.) Main Sewers
        c.) Branch Sewers
    2.) Pg.66- Diagram of Tides for 1907 at Arch St. Pier
        a.) 12 columns listing each month
        b.) Upper Curve indicates weekly mean high water
        c.) Lower curve indicates weekly low water
    3.) Pg.67- Table I- Rainfall (in Inches) in City of Philadelphia During 1907
        a.) 1907
        b.) South Philadelphia
        c.) Central Philadelphia
        d.) Manayunk
        e.) Germantown
        f.) Frankford
        g.) West Philadelphia
        h.) Average Rainfall
        i.) U.S. Weather Bureau
    4.) Pg.68- Table II- Details of Most Severe Storms
        a.) 1907
        b.) record at Locality and District
        c.) Precipitation, inches
        d.) Duration, hours
        e.) Mean Rate per hour, inches
        f.) Maximum Rate per hour in Inches and Minutes
        g.) Max fall in one hour, inches
    5.) Pg.69- Table III- Intensities of Rainfall and Maximum Flow in Sewer, 13 feet 0 Inches Diameter, 7th Survey District
        a.) 1907
        b.) 12th and Diamond Streets, Stream Gauge Records
        c.) Pluviometer Records

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Pg.50-81

Pg.50

I. Main Sewers

A. Appropriations for construction of main sewers, $805,500

1.) $765,000 was apportioned among 22 sewers

2.) $25,000 appropriated for the extension of the Dobson's Run sewage sewer

3.) $14,000 is excess amount in appropriation for extension of Cobb's Creek Intercepting sewer and will be used for extension of this sewer

B. Detailed statement of work

1.) Bingham street sewer extension, from Loudon Street to Wyoming Ave., in Wyoming Ave., from Bingham Street to "B" street, $14,500

Pg.51

2.) Gunners Run Relief Sewer in Indiana St., from Rosehill to Front, $45,000

3.) Jasper St. sewer, from Frankford to Buckius St., $14,850

4.) Market St. sewer reconstruction, from present terminus east of 36th to 36th, $4,500

Pg.52

5.) 9th St. sewer, from Erie to Butler, in Butler to 10th, and in 10th, from Butler to Luzerne, $25,000

6.) Extension of sewer in Oakland St., from present sewer northeast of Foust street to stream northeast of Vankirk St., $29,000

Pg.53

7.) Pine St. sewer (Schuylkill outlet) reconstruction, $25,000

8.) Extension of Rock Run System in Ashdale St., from present sewer at 5th to Fairhill St., and in Fairhill, from Ashdale to Fisher's, and in Fisher's, from Fairhill to 6th, $55,000

9.) 64th Street sewer, from Vine to Millbourne Ave. and across private property to Cobb's creek, $16,000

Pg.54

10.) 69th St. sewer, from Dick's Ave. to Elmwood Ave., $16,000

11.) Thomas Run sewer system extension in Florence Ave., from present terminus near 55th St. to 54th St., in 54th, from Florence to Willows, in Willows, from 54th to 53rd, in 53rd to line of Hadfield Street, and in line of Hadfield St. across private property to the West Chester and Philadelphia Railroad, $24,000

12.) Tulip St. sewer, from Westmoreland St. to Allegheny Ave., $16,300

Pg.55

II. Intercepting Sewers

A. First attempts were made by man to improve conditions about his dwelling by burying the offal and refuse which collected in the midden heap

B. Nuisances created by dense populations in old world cities resulted in construction of drains to nearest water cities
C. Demand for improved sanitation required that means be provided for carrying beyond the reach of habitations the foul discharges into nearby streams, to give at least temporary relief
D. Sewers built and projected to intercept dry weather flow from existing water carriage sewers
E. Built along east and west sides of Schuylkill river above the Fairmount Dam, and along the Wissahickon creek, and are under construction at Cob's creek, Frankford creek, and Pennypack creek

Pg.56

F. Detailed work of construction
1.) Cobb's Creek Intercepting sewer on the line of 75th St., from Cobb's creek to Gray's Ave., in Gray's, from 75th to Island Ave., in Island, from Gray's to Woodland, thence on the east side of Cobb's creek through streets and private property from Woodland Ave. North, $75,000
2.) Extension of Cobb's Creek Intercepting sewer in Cobb's Creek and Parkway, along east of Cobb's creek, from Woodland North, $36,000

Pg.57

3.) Extension of Cresheim Creek Intercepting System in Cresheim Valley, from the end of the present sewer south of Willow Grove to Stenton, $31.000
4.) Frankford Intercepting sewer in Wakeling, from Ditman to Cottage, $40,000

Pg.58

5.) Extension of Frankford Intercepting System in Wakeling, from present sewer south of Cottage to Valley, and in Valley to present sewer North of Haworth, $40,000
6.) Hartwell lane sewer, from the Wissahickon creek to Seminole, $26,850
7.) Lincoln sewer, from Cresheim Valley to Navahoe, $39,000

Pg.59

8.) Schuyler, from Roberts to Clapier, $14,000
9.) Wissahickon High Level Intercepting sewer cut-off, across private property in line of 24th and in Stokley from present terminus at Norristown Branch to the Richmond Branch of the Philadelphia and Reading Railway, $35,000
10.) Wissahickon High Level Intercepting sewer cut-off in Stokley, from south of Hunting Park to Juniata, $50,000

Pg.60

11.) Extension of Wissahickon High Level Intercepting sewer cut-off and storm water sewer in Stokley, from Juniata to present storm water sewer northwest of Roberts, $81,000
12.) Wissahickon Low Level Intercepting sewer extension along the Wissahickon creek through Park property, from a point south of Rittenhouse lane, $50,000

Pg.61

13.) Wissahickon Low Level Intercepting sewer along Wissahickon creek and through Park property, from the West Bank of said creek at Rittenhouse street north to Walnut lane, $36,500

III. Wingohocking Creek System

A. Wingohocking Creek System carries a concentrated sewage into Frankford creek

B. Purification of Frankford creek is important public project

C. Planned extensions of main sewers in this system for ultimate purification

Pg.62

D. One main sewer built in this system during the year

1.) 12th, from Louden to Ruscomb, $8,500

IV. Cohocksink Sewer

A. For repairs, reconstruction and improvement of old sewers ordinances applied $5,000, $15,000, and $1,400 to the Cohocksink sewer

B. Work prosecuted at two locations

1.) Reconstruction of Cohocksink sewer in Thompson, from Leithgow to a pint about 86 feet east of 4th

Pg.63

a.) length and size rebuilt- 269 feet of 11 feet diameter sewer in place of the old 10 feet diameter sewer

b.) $20,917.58

2.) Reconstruction of laterals on Tasker, between 23rd and 24th, $382.54

V. Drainage in the Southern Section of the City

A. transition from truck farm to urban area

Pg.64

B. No part of the City is destined to be more important in relation to its expansion than the low lying land south of Oregon Ave and between the Delaware and Schuylkill rivers

C. Improvements will be seen in the South Broad Street Boulevard of League Island Park, the establishment of a Plaza at the beginning of the widened avenue, and the intention of the administration to improve river embankments

D. Sewers must be started at the rivers

E. On e of the most urgent sewers under this heading is that proposed on Shunk street, from Front to Broad

Pg.65

F. Sewer on Jackson and 29th was completed and put in service this year, $30,000

G. Extension of Jackson sewer, from present sewer east of 30th to 29th and in 29th, from Jackson to Morris, $35,000

VI. The Boulevard Sewers

A. To permit extension of Boulevard, need to construct number of sections

Pg.66

1.) Sewer in Oakland, from stream north of Benner to north line of The Boulevard, thence on private property to stream north of The Boulevard, $20,000

2.) Sewer in Oxford Ave., from "R" to the south line of The Boulevard, $13,000
3.) Sewer across The Boulevard, on line of Tyson and in The Boulevard, from Tyson to stream northeast, $10,000

Pg.67

4.) Sewer in The Boulevard, from Faunce to Hartel, and appurtenant work, $60,000

VII. Market Street Subway Sewers
- A. Work on sewers in connection with construction of Market subway active progress
- B. Principal work was upon sewer on the north side or Market, between Tenth and City Hall
- C. Work also done on intersections of Market, from Front to 13th

Pg.68

VIII. Investigations for more Sanitary Methods of Sewage Disposal
- A. For every sewer that is built by City of Philadelphia, an application must first be forwarded to that Department, and a permit obtained
- B. In Granting the permits for the sewer extensions, there are conditions
  1.) City of Philadelphia shall prepare and submit a plan for the collection, purification, and disposal of sewage
  2.) Existing systems shall not be at cross purposes with this plan
  3.) Progress shall be made during each year towards this end
- C. Director of Department of Public Works and Chief Engineer of City have visited all modern sewage disposal plants in eastern portion of country

Pg.69

- D. Conservation of public health by searching for the causes of disease and seeking to apply the remedy to the extermination of the cause
- E. Also investigating various methods for a more sanitary disposal of sewage

Pg.70

- F. Experimental Testing Station has been established, utilizing the Spring Garden Testing Station, $7,500

Pg.71

IX. Branch Sewers and Inlets
- A. For branch sewers and inlets, $1,000
- B. New contracts for branch sewers- 186
- C. 185 contracts completed (some carried over from previous year)
- D. 22.120 miles of branch sewers at public expense, $608,017.35
- E. Contracted entered for construction, $15,000

Pg.72

- F. Construction entered for construction and reconstruction of inlets, etc., $13,000
- G. Construction and reconstruction of 167 inlets

X. Private Sectors
- A. 5.630 miles of branch sewers

XI. Summary of Work Upon Sewers
- A. 36 sewers under construction

1.) 11 intercepting
2.) 3 reconstruction
3.) total length= 35.432 miles

Pg.73

XII. Sewer Connections and Records
A. Sewer connections of 7,897 buildings authorized, 2,919 permits

Pg.75

B. 31 plans of lateral pipes put in old sewers
C. 333 plans of main and branch sewers were received and registered

XIII. Rainfall, Discharge and Tidal Observations
A. Sewers must meet requirements of rainfall, impermeable pavements, and tall buildings with high population
B. Automatic stream gauges placed in sewers to record depth of flow and time of flood wave and fluctuations
C. Tides
1.) Mean tides for this year
a.) Low tide--7.87
b.) High tide--2.87
2.) Mean tides for last 9 years
a.) Low tide--7.54
b.) High tide—2.45
3.) Established planes for tides at Arch Street
a.) Low tide—7.50
b.) High tide—2.25
4.) Variations of the tides for last 9 years is 5.09 feet
D. Temperature had an excess of +565 degrees
E. Last year was a deficiency of 276 degrees

XIV. Miscellaneous
A. Sewers/Systems
1.) Pg.50- Main sewerage systems of the City of Philadelphia, total mileage of main sewers constructed and under contract: 180.615 miles
2.) Pg.54- Sheet No.1-Main sewer in Devereaux, from Hegerman to Keystone in Keystone
B. Tables/Diagrams
1.) Pg.79- Table 1- Rainfall (in Inches) in City of Philadelphia During 1908
2.) Pg.80- Table 2- Details of Most Severe Storms
3.) Pg.81- Table 3- Intensities of Rainfall and Maximum Flow in Sewer 13 feet, 0 Inches in Diameter, 7th Survey District

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Pg.47
I. Main Sewers
A. $627,500 has become available for the construction of main sewers
1.) $527,000 apportioned among sixteen sewers
Pg.48
2.) $30,000 apportioned for construction of Pennypack Creek Intercepting Sewer, adjacent to Pennypack creek, between Delaware River and Frankford Ave.
3.) Detailed statement of work on main sewers
a.) Botanic Creek System in 57th, from east of Gibson Ave. to Eastwick Ave., in Eastwick Ave. from 57th to 56th, and in 56th, from Eastwick Ave. to the Sckuylkill river, $38,000
b.) Clearfield St., from 12th to 16th, $72,000
Pg.49
c.) Cottman street, from Delaware river to Tacony St., $32,000
d.) Devereaux St. from Hegerman to Keystone, $60,907.93
e.) Gunners' Run Relief sewer in Indiana St., from Rosehill to Front, $45,000
Pg.50
f.) Gunners' Run Relief sewer in Indiana street, from west of "A" street to Hancock street, $50,000
g.) Gunners' Run Relief sewer in 12th from Indiana to Clearfield streets, $25,000
h.) Market street sewer extension, from east of 63rd to 63rd, thence south on 63rd street through private property to Cobb's creek, $10,000
Pg.51
i.) Magee St., from Torresdale Ave. to Jackson St., in Jackson street, from Magee to Unruh and in Unruh from Jackson to Algard, $45,000
j.) Rock Run System in Ashdale street from 5th to Fairhill St., in Fairhill St., from Ashdale St. to Fisher's Ave., in Fisher's Ave., from Fairhill to 6th, $55,000
k.) Saul Street, from Pratt to Dyre, in Dyre from Saul to Akron, and in Akron, from Dyre to Oxford, $10,000
Pg.52
l.) 3rd from Ashdale to Tabor, $21,000
m.) Wyoming Ave., from Frankford creek to Adams Ave., $30,000
II. Intercepting Systems
A. Sewer system of a large city is stamped with ideas of various decades which have passed into history
Pg.53

B. Great percentage of increase in population has changed conditions to make it of prime importance in city development to conserve and protect the inter-city streams from pollution

C. Work upon intercepting sewers for the accomplishment of results has been under way in various drainage basins: Cobb's creek, Wissahickon creek, Frankford creek, Cresheim creek, and Dobson's run

Pg.54

D. Detailed report of construction

1.) Bristol street, 29th and across private property, from south of Juniata street to Hunting Park Ave., and in Hunting Park Ave., from 29th to McMichael, $30,000

2.) Clapier from Schuyler northeast to offset in Schuyler, $2,100

3.) Cobb's creek intercepting sewer in Cobb's Creek Park and Parkway along east side of Cobb's creek, from Woodland Ave. North, $36,000

Pg.55

4.) Cobb's creek intercepting sewer in Cobb's Creek Park and Parkway and adjacent to Cobb's creek through Mt. Moriah Cemetery, from near 68th North to Florence Ave., $60,000

5.) Cresheim creek intercepting sewer in Cresheim Valley drive, from south of Willow Grove Ave. to Stenton Ave., $31,350

Pg.56

6.) Dobson's Run intercepting sewer in Ontario, from Roberts' Ave. to Henry and across private property to south of Juniata, $25,000

7.) Frankford intercepting system in Wakeling street, from Cottage street to Valley street, and in Valley, to Howarth, $40,000

8.) Frankford intercepting system across private property, from Lewis street to Torresdale Ave. and in Torresdale Ave. to south of Orthodox, $50,000

Pg.57

9.) Hartwell lane, from Wissahickon creek to Seminole Ave., $26,850

10.) Lincoln Ave, from Cresheim Valley drive to Navahoe St., $39,000

Pg.58

11.) Wissahickon high level intercepting sewer cut-off and storm water sewer in Stokley Street, from Juniata Street to Northeast of Roberts Ave., $81,000

12.) Wissahickon high level intercepting sewer cut-off in Stokley Street, from northeast of Roberts to Ainslie, $48,000

III. Wingohocking Creek System

A. Except the Schuykill, largest stream included in City's borders is Frankford creek

1.) two main tributaries

a.) Little Tacony

b.) Wingohocking creek

Pg.59

B. Wingohocking creek system is 5,000 acres

C. \idea that in an area which has a great population, the projects proposed for present construction are of some magnitude and require years for completion

D. sewage which is discharged daily into Frankford creek create a condition which may become a menace to the City
E. one of the first projects in purification of sewage be carried out in Wingohocking territory
F. extensions of existing large sewers must be built
1.) Wingohocking creek system in Annsbury street from the North Pennsylvania Railroad to Lawrence street, $32,000

Pg.60

IV. Cohocksink Sewer
A. reconstruction and relief of the Cohocksink sewer, $1,500
B. Repairs and improvement of old sewers, $1,000

V. Drainage in South Philadelphia
A. Portion of the City between the rivers south of Oregon Ave.
B. This territory divided equally by Broad street, great plaza at the Oregon Ave. intersection, and a great park under construction at the League Island end

Pg.61

C. Natural expansion in pier accommodations must be confined to the Delaware River and lower part of the Schuykill River within or adjacent to this territory
D. Construction of sewers should be provided for
1.) Shunk street, from Front to 5th, $50,000

VI. Investigations for More Sanitary Methods of Sewage Disposal
A. Act of Assembly (1905), State Department of Health created, marks beginning of a new era in sanitary work

Pg.62

B. The Department, in order to preserve the purity of the waters of the State, placed all towns and cities on probation in the use of streams for sewage disposal
C. Obligatory to take up the problem
D. Essential and economical procedure to establish a testing station
E. Testing station established by using the old filtration experiment station at Spring Garden, after adapting it to the varying conditions of the sewage experiments

Pg.63

F. certain general propositions in relation to the disposal of the sewage in this City present themselves
1.) Disposal of crude or untreated sewage by dilution into the adjacent river and streams, cannot be entertained as affording any permanent solution of the problem
2.) The sewage farm is eliminated

Pg.64

3.) Contact bed, same objection will apply to that process of bacterial treatment carried on in what is known as the contact bed
4.) Septic tank, failure of this process to accomplish more than a small percentage of the claims which had been made for it, will militate against its adoption
5.) Use of bacteria beds is foreshadowed

6.) Disinfection is a process whereby the liquids in transit may be freed from the injurious pathogenic bacteria (cause of many diseases)

Pg.65

G. A study is being made of the most satisfactory methods of disposing of sludge, the most difficult problem in connection with the subject
H. The City is prepared to construct an intercepting sewer along Pennypack creek from Frankford Ave. to the Delaware River

Pg.66

V. Branch Sewers and Inlets

A. No funds provided for construction of branch sewers and inlets in1909
B. Number of new contracts drawn was 157, and 192 contracts completed
C. 24.628 miles of branch sewers at public expense, $581,548.81

Pg.67

D. Contracts were entered into for the construction and reconstruction of inlets, curved curbing, laterals, manholes, etc.
E. The work accomplished comprised the construction and reconstruction of 307 inlets not included in sewer contracts

Pg.68

VI. Private Sewers

A. work was executed upon 49 contracts for the construction of sewers at private cost under the inspection of the City, 7.424 miles of branch sewers

VII. Summary of Work upon Sewers

A. total number of main sewers under construction was 27
   1.) 12 were intercepting sewers
   2.) 1 reconstruction
   3.) total length- 38.049 miles

Pg.69

VIII. Sewer Connections and Records

A. Sewer connections of 9449 buildings were authorized
B. 2,780 permits

Pg.71

IX. Rainfall, Discharge and Tidal Observations

A. In order to obtain results, the instruments which automatically provide records must always be in working order, which requires systematic attention without regard to the season or the weather

Pg.72

B. Record has been made of various storms, showing relative rainfall and run-off
C. Pluviometers are arranged at 6 points in offices of some of the District Surveyors
D. Tide gauge arranged at Arch Street Pier
E. 1909 can be noted for its drought and climatic changes
F. Jan. 5th=60degrees, Jan. 8th=16 degrees, greatest variation in 24 hours being 36degrees
G. Feb 10th, 8a.m.=32 degrees; 12:30p.m.=64degrees; 2:30p.m.=45 degrees
H. Feb 24th at noon a heavy pall fell over City making the day as dark as at night with a temperature of 62degrees

I. Dec 24th and 25th 22.8 inches of snow fell, heaviest snow in many years, eclipsing the storm of 1899

X. Miscellaneous

A. Pictures
   1.) Pg.50- View of Devereaux Street Sewer
   2.) Pg.52- Stepped Section on Wyoming Ave. Sewer East of Frankford Creek
   3.) Pg.54- Rock run Sewer on Fairhill Street South of Fisher Avenue
   4.) Pg.58- Wingohocking Sewer on Annsbury Street West of Fifth Street
   5.) Pg.65- Spring Garden Testing Station Showing Sprinkling Filter

B. Sewage/Systems
   1.) Pg.48- Botanic Creek System in 5th Street from present sewer East of Gibson Ave. to Eastwick Ave., in Eastwick Ave, from 57th to 56th, and in 56th from Eastwick Ave. to Schuylkll River
   2.) Pg.56- Extension of Wissahickon High Level Intercepting Sewer cut-off, and storm water Sewer in Stokley Street from Juniata St. to present storm water sewer Northwest of Rogers Avenue
   3.) Pg.60- Sheet No. 2, details. Dobson's Run storm water and sewage sewer extension in Ontario Street from Roberts Avenue to Henry Street and across private property to south of Juniata Street
   4.) Pg.64- Sewage Purification Works, Philadelphia, General Plan of Spring Garden Testing Station

C. Tables/Diagrams
   1.) Pg.70- Table 4- Diagram of Tides for 1909 at Arch Street
   2.) Pg.72- Diagram Showing Length of Completed Sewers
   3.) Pg.74- Table No.1- Rainfall (in Inches) in City of Philadelphia During 1909
   4.) Pg.75- Table No.2- Details of Most Severe Storms
   5.) Pg.76- Intensities of Rainfall and Maximum Flow in Sewer 13 Feet 0 Inches Diameter, Seventh Survey District

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Pg.43-74

Pg.43

I. Main Sewers
   A. Main sewers are to branch sewers as stem of a tree is to branches
   B. Main stem, branch tributaries, development of unproductive ground into houses

Pg.44

   C. "City Betterment"-loan of $32,500
   D. Detailed statement of the sewer- Pennypack creek intercepting sewer adjacent to Pennypack creek between Delaware River and Frankford Ave.
      1.) Botanic Creek System in 57th St., from Gibson Ave. to Eastwick Ave; in Eastwick Ave from 57th to 56th, and in 56th from Eastwick Ave. to Schuylkill River, $38,000

Pg.45

      2.) Clearfield Street from 12th to 16th, $72,000
      3.) Cottman street from Delaware River to Tacony Street, $32,000
      4.) Gunners' Run relief sewer in Indiana sewer from west of "A" street to Hancock street, $50,000

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      5.) Gunners' Run relief sewer in 12th from Indiana to Clearfield, $25,000
      6.) Market street sewer extension, from east of 63rd to 63rd, then south on 63rd through private property at Cobb's creek, $10,000
      7.) Magee street, from Torresdale Ave. to Jackson St., in Jackson from Magee to Unruh, and in Unruh from Jackson to Algard, $45,000

Pg.47

      8.) 3rd St. from Ashdale to Tabor, $21,000

II. Intercepting Systems
   A. Present inhabitants are seen as reasons for allowing streams to become polluted until an action is needed to make them pure again.

Pg.48

   B. Work has been carried on in the City in the building or extension of intercepting sewers
      1.) Dobson's run
      2.) Cobb's creek
      3.) Frankford creek
      4.) Wissahickon creek
      5.) Pennypack creek
      6.) Sandy run

Pg. 49

   C. Construction

1.) Bristol street, 29th across private property from Juniata street to Hunting Park, and in Hunting Park from 29th to McMichael street, $30,000
2.) Cobb's creek intercepting sewer in Cobb's Creek Park and Parkway and adjacent to creek through Mt. Moriah cemetery from 68th to Florence, $60,000
3.) Dobson's run intercepting sewer in Ontario from Roberts' to Henry and across private property to south of Juniata, $33,000

Pg.50

4.) Frankford Intercepting System across private property from Lewis to Torresdale and in Torresdale to south of Orthodox, $50,000
5.) Pennypack creek intercepting sewer adjacent to Pennypack creek, between Delaware River and Frankford, $30,000
6.) Wissahickon high level intercepting sewer in Stokley from Northeast of Roberts' to Ainslie, $48,000

Pg.51

III. Wingohocking Creek System
A. The City drains into Wingohocking creek

Pg.52

B. Progress in conservation of tributary streams is evident in preventing pollution, notably in a large territory known as Tacony Creek Park.
C. Construction of intercepting sewers followed by improved sanitary appearance
D. Work of construction is a small part of the work of the Bureau.
1.) Wingohocking Creek System in Annsbury street from North Pennsylvania Railroad to Lawrence street, $32,000

Pg.53

IV. Cohocksink Sewer
A. Completed drainage system, worn out
B. Reconstruction and relief of Cohocksink sewer, $1,500

Pg.54

V. Drainage in South Philadelphia
A. Definition of South Philadelphia- portion south of the confines of the old City
B. Definition of drainage problems South Philadelphia- confined to section below Snyder Ave.
1.) south of this point lay tracts of the meadow land subject to tidal influence, drained by intersecting ditches, discharging at low tide by means of sluices in rivers
2.) problem of proper drainage system

Pg.55

C. Sewers
1.) Shunk street from Front to 5th, $50,000

VI. Examination of Old Sewers
A. $1,000 for examining old sewers in the City

Pg.56

B. $5,000 for examining bridges and sewers
C. field work of this corps was prosecuted when there was a lack of funds

D. work had covered greater portion of main sewers constructed prior to 1890

Pg.57

VII. Sewers Constructed in Connection With Bridge Contracts
   A. Levick Street Improvement, $8,758.28

VIII. Storm Water Sewer in Connection With Bridge at Chelten Ave Under North Pennsylvania Railroad
   A. $43,341.10

IX. Sewers Built in Connection With the widening of Delaware Ave at Vine and South streets
   A. $16,631.69

X. Sewers Built in Connection with the Boulevard
   A. Drain the Boulevard between Cottman and Rhawn , $26,666.50

XI. Drainage Work in Connection With the Improvement of South Broad Street

XII. Sewers Built in Connection With the Abolishment of Grade Crossings
   A. $23,552.00

Pg.59

XIII. Investigation for More Sanitary Methods of Sewage Disposal
   A. By 1912 the City should prepare a plan for collection and disposal of sewage of the entire city of Philadelphia
   B. Old water filtration experiment station at Spring Garden was remodeled and fitted up as a sewage experiment station
   C. Experiments began in 1909, and continued for one year under all seasons
   D. Report of work performed at testing station
      1.) Studies were carried on which determined the practicability of rapid methods of sedimentation, so less land and construction required
      2.) Methods of constructing and operating percolating filters were determined whereby they could be operated at higher rates than usual

Pg.61

      3.) In order to secure data for properly designing sewage collectors, 24 hour gaugings of the dry weather flow in sewers draining characteristic areas were carried on

Pg.62

      4.) The magnitude of the problem requires officials to be in constant touch with the practice of other cities

XIV. Pennypack Creek Sewage Disposal Works
   A. $150,000 for purpose of constructing a sewage disposal works for City institutions in Torresdale
   B. Drainage of village of Holmesburg

Pg.63

   C. Sewage disposal works consist of sedimentation tanks modeled after the so-called Emscher tanks of Germany
   D. Work placed under contract and divided
      1.) Contract No. 1 for pumping station and operating house and for grading, macadamizing and appurtenant work

Pg.64

2.) Contract No. 2, for pumps, engines, gas producers and accessories at Pennypack Creek Pumping Station
3.) Contract No. 3 comprises a screen, sludge elevator and drying machinery
4.) Contract No.4, for constructing sewage disposal works, force main and accessories at State road and Ashburner street

XV. Branch Sewers and Inlets
A. No funds provided for construction of branch sewers and inlets

Pt.65

B. 11.445 miles of branch sewers at public expense, $317,884.83

XVI. Private Sewers
A. 104 contracts for construction of sewers at private cost under City inspection

Pg.66

XVII. Summary of Work Upon Sewers
A. Total number of main sewers under construction was 16
1.) 6 were intercepting sewers
2.) one reconstruction
3.) total length of all sewers built during 1910, 28.765 miles

Pg.67

XVIII. Sewer Connections and Records
A. Sewer connections of 10,451 buildings were authorized
B. 2,658 permits

Pg.68

C. Receipts of the Bureau from all sources during the year were $39,146.87

XIX. Rainfall, Discharge and Tidal Observations
A. Importance of obtaining a record of rain storms is apparent in its relation to the design of sewers
B. Important to know comparative relation of run-off to rainfall under present urban conditions, obtained from automatic registering instruments
C. Tables show the observations taken from pluviometers and stream gauges

Pg.70

D. 24 hour gaugings were taken in sewers in different sections of the City; records were obtained in determining the actual discharge of the sewers compromising the dry weather flow only
E. Tidal observations were continued at Arch Street Pier on the Delaware river

XX. Miscellaneous
A. Pictures
1.) Pg.44- Reinforced Concrete Sewer in Forms at Cottman Street, Delaware river
2.) Pg.48- Dobson's Run Sewer, Tunnel Section, at P.G.&N.R.R., on Line of Ontario Street
B. Sewers/Systems
1.) Pg.48- Sheet No.8&9, Cobb's Creek Intercepting Sewer Extension in Cobb's Creek Park and Parkway and adjacent to Cobb's Creek through Mt. Moriah cemetery from present terminus at 68th St. North to Florence Ave

2.) Pg.52- Wingohocking System in Annsbury St. from North Pennsylvania Railroad to Lawrence St.
3.) Pg.60- Thomas Run System
4.) Pg.62- Sewage Purification Works, Pennypack Creek section

C. Tables/Diagrams
1.) Pg.60- Summary of Data Obtained from Gaugings of Dry Weather Flow, Made in 1910
2.) Pg.67- Diagram Showing Length of Completed Sewers
3.) Pg.68- Relation Between Intensity and Duration of Rainfall as shown by Pluviometer Records during the year 1910, Philadelphia Pa
4.) Pg.70- Diagram of Tides for 1910 at Arch Street Pier
5.) Pg.71- Table No.1- Rainfall (in Inches) in City of Philadelphia During 1910
6.) Pg.72/72- Table No.2- Details of Most Severe Storms
7.) Pg.74- Table No.3- Intensities of Rainfall and Maximum Flow in Sewer 12 Feet Diameter, Seventh Survey District

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I. Main Sewers
- A. To develop a city it is essential to provide adequately for sewage construction.
  - 1.) Street improvements necessary to develop real estate resulting in increase of taxable values.
  - 2.) $336,500 was made available to construct main sewers between May 25 and July 21, 19911.
    - a.) Statement of the work of the main sewers
      - i.) 57th St. between Susquehanna and Jefferson, $20,000
      - ii.) 57th St. extension from north of Lebanon to Susquehanna, $9,000
      - iii.) Luzerne St. from 10th to Old York, $7,000
      - iv.) Rock Run sewer extension in Fisher Ave. from east of 6th to 10th, $23,000
      - v.) Rock Run sewer extension in 6th St. from Fisher Ave. to Brookedale from 6th to 7th, $35,000
      - vi.) 3rd from Ashdale to Tabor, $21,000

II. Intercepting Systems
- A. Sewers have a specific purpose- to remove pollution from the creeks or rivers within the City.
- B. Two conduits
  - 1.) sewage
  - 2.) storm water
- C. Sewers were formerly used to discharge into the nearest creek.
- D. Intercepting sewers needed to avoid polluting creeks, as a result of better sanitary arrangements being needed.
- E. Detailed account of work in valleys of Cobb's creek, Pennypack creek, Frankford Creek, and Dobson's run
  - 1.) Bristol St., 29th from Juniata to Hunting Park, and in Hunting Park from 29th to McMichael, $30,000
  - 2.) Cobb's creek intercepting sewer in Cobb's Creek Park and Parkway and adjacent to creek through Mt. Moriah Cemetery from 68th north to Florence, $60,000
  - 3.) Cobb's creek intercepting sewer extension in Cobb's Creek Park and Parkway from south Florence Ave. to Thomas Ave., $23,000
  - 4.) Cobb's creek intercepting sewer extension in Cobb's Creek Park, from terminus at Thomas Ave. to Baltimore Ave., $23,000
  - 5.) Dobson's run intercepting sewer in Ontario St. from Roberts Ave. to Henry, $25,000

6.) Dobson's run from terminus near Ontario and Henry to existing sewer near Juniata and Bristol, $31,000
7.) Frankford intercepting sewer extension in Torresdale Ave., from terminus southwest of Gillingham St. to Margaret St., $37,500
8.) Pennypack creek intercepting sewer adjacent to Pennypack creek between Delaware river and Frankford Ave., $30,000
9.) Pennypack creek intercepting sewer extension in Race road, from Mill St. to Frankford Ave., $11,500

III. Wingohocking Creek System
- A. Before Philadelphia existed, there were settlements by the Germans at Germantown and by the Society of Friends at Frankford.
- B. Two populous communities connected from a sanitary standpoint in the Wingohocking creek
  - 1.) all sewage from Germantown discharged and flows into Frankford creek
  - 2.) Department of Public Works wants to better conditions in this area
    - a.) By extending the large main sewer
    - b.) By extending the smaller tributary main sewers in the area
    - c.) By formulating plans for an intercepting sewer to remove pollution from the Frankford creek
- C. Work carried on during the years
  - 1.) Hunting Park from 6th to 9th, $11,500

IV. Cohocksink Sewer
- A. In early stages, sewer construction carried on, as emergency required.
- B. Now those materials have worn out and weakened, resulting in sewers collapsing
  - 1.) Cohocksink sewer system, $1,500: Thompson St. between 4th and Orianna.
  - 2.) For reconstruction of the Cohocksink sewer, $50,000
    - a.) This sum is for rebuilding sewer in 12th from Diamond St. to Dauphin St.

V. Sewers Constructed in Connection with Bridge Contracts.
- A. Sewers constructed in connection with bridge contracts
  - 1.) Connection with Roberts Ave. bridge, under Chestnut Hill Branch of the Connecting Railway
  - 2.) Connection with the bridge on the line of Springfield Ave., under West Chester and Philadelphia Railroad

VI. Sewers Built in Connection with the Widening of Delaware Avenue at Vine and South Streets
- A. Connection with contract for widening Delaware Avenue, between Vine and Fairmount Ave
- B. Connection with contract for widening Delaware Ave. at South St., $3,084.87

VII. Sewers Built in Connection with the Boulevard
- A. Work upon sewers for drainage along the Boulevard has been prosecuted during the year

VIII. Sewers Built in Connection with the Abolishment of Grade Crossings

A. Work upon sewers under four contracts for the abolishment of grade crossings was continued, $33,334.46

IX. Investigation for More Sanitary Methods of Sewage Disposal
- A. Consultations held with expert sanitary engineers, and other cities were visited to examine special machines for sewage disposal
- B. This is a problem of large magnitude
- C. Surpasses the quantity of sewage to be treated in other cities

X. Pennypack Creek Sewage Disposal Works
- A. $150,000 for constructing sewage disposal works for City institutions
- B. Matters affecting design
  - 1.) Purchase of land adjacent to Pennypack by the City east of Frankford Ave. to State road for park purposes
  - 2.) Purchase of two tracts of ground for establishing homes for feeble minded
  - 3.) Desirability of removing pollution from waters which reached the intake to the Torresdale water filtration works
- C. work upon the contracts of this project
  - 1.) Contract No. 1, for pumping station and operating house, for grading work, $21,000
  - 2.) Contract No. 2, for pumps, engines, gas producers and accessories at Pennypack Creek Pumping Station, $20,000
  - 3.) Contract No. 3 comprised a screen, sludge elevator and drying machinery
  - 4.) Contract No. 4, for constructing sewage disposal works, force main and accessories at State road and Ashburner street, $67,000
  - 5.) Contract No. 5, for furnishing operating machinery and accessories, $1,500
  - 6.) Contract No. 6, for the construction for frame buildings and painting valve box covers, $900
  - 7.) Contract No. 7, for a hot water heating plant, $1,500
- D. Miscellaneous contracts entered into for materials to be delivered

XI. Branch Sewers and Inlets
- A. No funds provided for the construction of branch sewers and inlets in the annual appropriation for 1911

XII. Private Sewers
- A. Work was executed during the year upon 67 contracts for the construction of sewers at private costs, under City inspection

XIII. Summary of Work Upon Sewers
- A. Total number of main sewers under contract and construction was sixteen
  - 1.) five were carried over from 1910
  - 2.) nine were intercepting sewers
- B. Total length of all sewers built during 1911 was 24.527 miles
- C. Sewer connections of 10,528 buildings were authorized during the year- 2,937 permits
- D. 433 drains were connected with the Manayunk intercepting sewer
- E. 235 plans of main and branch sewers were received from the District Surveyors
- F. 21 plans of lateral pipes put in old sewers were also returned

XIV. Rainfall Discharge and Tidal Observations
- A. Six pluviometers, five stream gauges to obtain meteorological data to affect workings of the sewer system
- B. Tabulation of the results is an essential part of the work of intelligent sewer design- data is also useful in the Courts
- C. Storms during the year
  - 1.) Wind storm, accompanied by rain- March 27th
  - 2.) Other severe storms
    - a.) July 17th
    - b.) August 3rd
    - c.) August 26th
    - d.) August 27th
    - e.) August 30th
    - f.) August 31st

XV. Tidal Observations
- A. Arch Street Pier on the Delaware river
- B. Climatic conditions during the year were subject to great variation
  - 1.) Heavy thunderstorm, destructive storm with high winds, and heavy precipitation
  - 3.) Greatest daily variation in temperature was on November 12th, 43 degrees
  - 4.) Accumulated excess in temperature for the year was 690 degrees

XVI. Miscellaneous
- A. Pictures
  - 1.) Pennypack Creek Sewage Disposal Works- Sedimentation Tank- pg. 32
  - 2.) Pennypack Creek Sewage Disposal Works- Percolating Filter During Construction- pg.33
- B. Diagrams
  - 1.) Diagram showing length of completed sewers- pg.36
  - 2.) Diagram of tides for 1911 at Arch St. Pier- pg.38
  - 3.) Relation Between Intensity and Duration of Rainfall- Pluviometer Records- pg.39
  - 4.) Autographic stream gauge record showing rise of water in sewer during storms of August 29, 30, & 31, 1911- pg.40
  - 5.) Diagram showing curves of rainfall and resultant storm-water discharge in sewer- pg.41
- C. Tables
  - 1.) Table I- Rainfall (in Inches) in the City of Philadelphia During 1911- pg. 42
  - 2.) Table II- Details of Most Severe Storms- pg. 43
  - 3.) Table III- Intensities of Rainfall and Maximum Flow in Sewers- pg.45

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“Locust Gardens”

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"Review"
"Low Grade Freight Line, Philadelphia and Reading Railway"

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Photo, caption "Chestnut St. as Widened, from 24th St. to 22nd St."

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Photo, caption "Springfield Ave. Bridge under Philadelphia and Baltimore Central R.R."

Grade Crossings Division
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"Philadelphia, Germantown, and Norristown Railroad"

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Photo, caption "Looking South on 12th St. from Cumberland St., Showing Conditions before Commencement of Work"

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Photo, caption "Looking South on 12th St. from Cumberland St., Showing Finished Conditions"

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Photo, caption "Looking North on 9th St. from Parrish St., Showing Finished Conditions"

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"Reading Terminal Extension"
"Richmond Branch Elevated"

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Plan, caption "Main Sewerage Systems of the City of Philadelphia"

Sewer Plans Division
Page 91
"General"
"Main Sewers"

Page 92
Table of appropriations for the construction and reconstruction of main sewers
"General Drainage Sewers"

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Photo, caption “Test Load on Bridge Beam”

Page 48 opp.
Diagram, caption “Cobbs Creek Intercepting Sewer”
Diagram, caption “Main Sewer in Westmoreland St.”

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Diagram, caption “Reconstruction of the Haverford Ave. Outlet Sewer”
Diagram, caption “Rock Run Sewer in Ashdale St.”

Page 51
Photo, caption “Wingohocking Sewer – 17 ft. 6 in. diameter”

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Photo, caption “Reinforced Concrete Sewer Construction – Sanger St. near State Rd.”

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Photo, caption “Stepped Section, Gray’s Ave. Sewer”

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Photo, caption “Concrete Sewer Pipe in Yard”

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Photo, caption “Load Test on Concrete Sewer Pipe”

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Photo, caption “All Concrete Inlet at 33rd and Wallace Sts.”

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Diagram, title “Results of Operation During 1914 of the Pennypack Creek Sewage Pumping Station”

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Photo, caption “Emscher Tanks and Planting Spaces Pennypack Creek Sewage Disposal Works

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Photo, caption “Operating Machine for Control of Distribution, Pennypack Creek Sewage Disposal Works”

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Photo, caption “Percolating Filters at Pennypack Creek Sewage Disposal Works”

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Photo, caption “Hydraulic Test on Concrete Sewer Pipe”

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Plan, caption “Proposed central traffic circuit and approaches”
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Plan, caption “Suggested area of assessment for the proposed southerly extension of 7th Ave. and widening of Varick St.”

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