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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.

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| SPECIAL INDEX | | |
| BUREAU OF SURVEYS, | | |
| ENGINE DIVISION. | | |
| COPY | FILE | SHEET No. |
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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. Lauderbach,
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 revisions 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 $4\frac{1}{2}$ feet in depth, supported 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 cylinders 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 Wissabickon 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 $6\frac{1}{4}$ 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, 8½ feet in diameter, at \$22.25 per foot, and 376½ feet of sewer, 7½ 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 $4\frac{1}{2}$ x $4\frac{1}{2}$ 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 $4\frac{1}{2}$ 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 possession 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 40 x 60 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. | INDLETS. | | MANHOLES. | | WELLS/LIES. | | 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 | | | \$23 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 | 4 | \$75 00 | | | 1,417 81 | S. H. Collom..... | John Noonan. |
| Girard avenue, from Cerinthian to South College avenues, thence to Poplar street..... | 3 ft. 0 in. x 2 ft. 0 in. | 1,658 | 2 | 3 | 9 | 75 00 | | | 4,223 99 | B. E. Hooven..... | W. D. Stine. |
| Second street, from Alice to Elfrith | 3 ft. 6 in. x 2 ft. 4 in. | 233.20 | 2 | 2 | 3 | 82 00 | | | 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 | 2 | 82 00 | | | 1,331 58 | Jas. McGill..... | B. McNichol. |
| Eighth street, from Dudley to Millin streets, thence westward..... | 3 ft. 6 in. x 2 ft. 4 in. | 394.86 | { 3 | 2 | 2 | 58 00 | | | 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 | 1 | 2 | 65 00 | | | 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 | 1 | 78 00 | | | 416 44 | Geo. Moore..... | F. P. Murray. |
| Preston st., from Ogden to Westminster..... | 3 ft. 0 in. x 2 ft. 0 in. | 244.50 | 2 | 1 | 2 | 65 00 | | | 894 12 | Wm. Yetter..... | Thos. McCann. |
| Hancock st., from Berks to Norris | 3 ft. 0 in. x 2 ft. 0 in. | 251.59 | | | 2 | 22 00 | | | 855 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 | 3 | 85 00 | | 1 \$90 00 | 1,654 00 | John Abel, Jr..... | W. H. Yeast. |
| Lancaster avenue, from Holly to Forty-first streets..... | 3 ft. 0 in. x 2 ft. 0 in. | 285.83 | | | 2 | 25 00 | | | 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 | | | 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 | 7 | 90 00 | | | 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 | 1 | 75 00 | | | 437 00 | Geo. Moore..... | F. P. Murray. |
| Elbert st., from Sixth to Seventh. | 2 ft. 3 in. x 1 ft. 6 in. | 235.25 | | | 3 | 24 00 | | | 758 93 | Jas. McGill..... | M. C. Hong. |
| Twentieth street, from Spring to Vine..... | 3 ft. 0 in. x 2 ft. 0 in. | 517.70 | 3 | 2 | 3 | 64 00 | | | 1,460 48 | John Abel, Jr..... | F. P. Deehan. |

Length and Cost of Sewers Built during 1884—(Continued).

| Location. | Size. | Length in feet. | INLETS. | | | MANHOLES, WELLS & LIES. | | | Per foot. | Total cost. | Inspector. | Contractor. |
|---|---------------------------|-----------------|----------|------------|------------|-------------------------|------------|------------|-----------|-------------|-------------------------------------|----------------------------|
| | | | Size No. | No. built. | Cost each. | No. built. | Cost each. | No. built. |  |  |  |  | Cost each. |
| 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 Parish..... | 2 ft. 6 in. x 1 ft. 8 in. | 362 | 3 | 1 | 66 00 | 3 | 20 00 | ..... | 2 25 | 934 50 | John Abel, Jr..... | F. P. Dechan. |
| Seventeenth street, from Ontario to Westmoreland..... | 3 ft. 0 in. x 2 ft. 0 in. | 544 | 2 | 2 | 90 00 | 2 | 22 00 | ..... | 2 56 | 1,436 64 | { C. Jordan..... Wm. Yetter..... | { Thos. Murray. S. Cox. |
| Second street, from Catharine to German, thence to Third..... | 3 ft. 6 in. x 2 ft. 4 in. | 864 | 3 | 1 | 87 00 | 5 | 25 00 | ..... | 2 33 | 2,405 12 | Geo. Moore..... | H. C. Eyre. |
| 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 Hadcock..... | 3 ft. 0 in. x 2 ft. 0 in. | 808 | 3 | 1 | 70 00 | 5 | 20 00 | ..... | 2 45 | 2,399 60 | E. Y. Shelmir..... | John Nolan. |
| Orthodox street, from Mulberry to Paul..... | 3 ft. 6 in. x 2 ft. 4 in. | 964.58 | 2 | 2 | 75 00 | 5 | 28 00 | ..... | 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 | 2 | 85 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 | 1,530 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. Dechan. |
| Diamond st., from Ninth to Tenth | 3 ft. 0 in. x 3 ft. 0 in. | 284 | ..... | ..... | ..... | 2 | 37 00 | 1 60 06 | 2 45 | 799 80 | S. H. Colton..... | J. McDonald. |
| Seybert st., from Twenty-second to Twenty-third..... | 3 ft. 0 in. x 2 ft. 0 in. | 424 | 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. 0 in. x 2 ft. 4 in. | 427.60 | 3 | 2 | 80 00 | 3 | 25 00 | ..... | 2 42 | 1,359 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 00 | ..... | 3 29 | 1,383 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 83 | 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. | | | MANHOLES. | | WELLS. | | Total cost. | Inspector. | Contractor. |
|---|---------------------------|-----------------|----------|------------|------------------|------------|------------------|------------|------------|-------------|---|--------------------------------|
| | | | Size No. | No. built. | Cost each. | No. built. | Cost each. | No. built. | Cost each. | | | |
| Eighteenth street, from Slides 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. | 1,910 | 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 Mantha creek to Haverford street..... | 3 ft. 6 in. x 2 ft. 4 in. | 1,778.20 | 2 | 11 | 95 00 | 8 | 22 00 | ..... | 2 34 | 5,501 99 | { C. Jordan..... Wm. Yetter..... | { B. McNichol. M. C. Hong. |
| 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 6 | { 23 00 30 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 3 | { 30 00 23 00 | ..... | 2 95 | 4,645 55 | { M. McGrath..... John Abel, Jr..... | { F. P. Dechan. M. C. Hong. |
| 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 Huntington..... | 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. Diets..... | 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. | 480 | 3 | 1 | 85 00 | 3 | 30 00 | ..... | 2 08 | 1,069 40 | E. Y. Sheinire..... | F. P. Murray, Jr. |
| Fifth street, from Wood to Willow Master street, from Twenty-fourth to Twenty-fifth, thence north on thence west..... | 3 ft. 0 in. x 2 ft. 0 in. | 639.33 | 2 | 2 | 95 00 | 3 | 23 00 | ..... | 2 47 | 1,838 13 | Jas. McGill..... | M. C. Hong. |
| 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. Diets..... | H. C. Eyre. |
| Water st., from Vine to Callowhill | 3 ft. 0 in. x 2 ft. 0 in. | 641 | ..... | ..... | ..... | 3 | 25 00 | ..... | 2 74 | 1,931 34 | Wm. Yetter..... | J. Kane. |
| | | 1,054 | ..... | ..... | ..... | 3 | 23 00 | ..... | 2 23 | 2,419 42 | C. Breininger..... | " " |

Length and Cost of Sewers Built during 1884—(Continued).

| 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. | | | | |
| Eight 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. Yeast. | |
| South College avenue, from Nineteenth to Twentieth street..... | 3 ft. 0 in. x 2 ft. 0 in. | 447 | | | | 3 | 27 00 | | 2 21 | 1,088 87 | E. Y. Shelmaire. | |
| 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. Shelmaire. | |
| German town avenue, from Somerset to Huntingdon street..... | 3 ft. 0 in. x 2 ft. 0 in. | 1,196 | { 2 | 6 | 95 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. | |
| 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. Shelmaire. | |
| Penn street, from Vine to South Spring Garden st., from Franklin to Lorain..... | 3 ft. 0 in. x 2 ft. 0 in. | 728.5 | | | | 5 | 24 00 | | 2 59 | 1,963 10 | A. Ruth. | |
| Cherry street, from Twenty-first to Twenty-second..... | 2 ft. 6 in. x 1 ft. 8 in. | 186 | | | | 1 | 23 00 | | 2 87 | 413 32 | N. B. Beam. | |
| Lawrence street, from York to Dauphin..... | 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. | |
| Thompson street, from Twenty-fourth to Twenty-fifth..... | 3 ft. 0 in. x 2 ft. 0 in. | 544 | | | | 4 | 25 00 | | 2 20 | 1,296 80 | Geo. L. Dietz. | |
| Somerset st., from Fifth to Reese and southward..... | 3 ft. 0 in. x 2 ft. 0 in. | 468 | | | | 3 | 25 00 | | 2 38 | 1,188 84 | Wm. McCay. | |
| Ridge avenue, Montgomery ave. to Twenty-fifth street..... | 3 ft. 0 in. x 2 ft. 0 in. | 524 | 3 | 1 | 71 00 | 2 | 25 00 | | 2 37 | 1,364 07 | C. Bretninger. | |
| Saunders street, from Powelton avenue to Filbert street..... | 3 ft. 0 in. x 2 ft. 0 in. | 616 | | | | 3 | 30 00 | | 2 24 | 1,469 84 | Jno. Carrie. | |
| Cadwalader street, from Columbia avenue, north..... | 2 ft. 3 in. x 1 ft. 6 in. | 663 | 3 | 1 | 85 00 | 4 | 23 00 | | 1 90 | 1,446 20 | H. M. Smith. | |
| Hamilton st., from Thirty-seventh eastward..... | 3 ft. 6 in. x 2 ft. 4 in. | 385 | | | | 3 | 29 00 | | 3 00 | 1,242 90 | Geo. L. Dietz. | |
| Tenth st., from Wallace to Melon | 2 ft. 3 in. x 1 ft. 6 in. | 330 | | | | 2 | 24 00 | | 2 00 | 708 00 | H. M. Smith. | |
| | 3 ft. 0 in. x 2 ft. 0 in. | 216 | | | | 2 | 23 00 | | 2 78 | 635 66 | N. B. Beam. | |

Length and Cost of Sewers Built during 1884—(Continued).

| Location. | Size. | Length in feet. | INLETS. | | MANHOLES. | | WELLS. | | Total cost. | Inspector. | Contractor. |
|--|---------------------------|-----------------|--------------|------------------|------------|------------|------------|------------|-------------|---|----------------|
| | | | No. built. | Cost each. | No. built. | Cost each. | No. built. | Cost each. | | | |
| Hope street, from Diamond street to Susquehanna avenue..... | 3 ft. 0 in. x 2 ft. 0 in. | 577 | 2 | 80 00 | 3 | 30 00 | | | 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 | 80 00 | 7 | 30 00 | | | 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 1 3 3 | { 80 00 75 00 | { 3 3 | 23 00 | | | 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 | 75 00 | 2 | 23 00 | | | 1,227 28 | E. Y. Shelmaire..... | M. C. Hong. |
| Seventh street, from Cumberland to Huntingdon..... | 3 ft. 0 in. x 2 ft. 0 in. | 568 | 2 | 75 00 | 4 | 24 50 | | | 1,550 72 | C. Breininger..... | W. H. Yeast. |
| Twenty-second street, from Tioga to Venango, and thence to Twenty-third..... | 3 ft. 0 in. x 2 ft. 0 in. | 1,051 | 2 | 79 00 | 6 | 27 00 | | | 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 | | | 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 | 90 00 | 4 | 23 00 | | | 1,880 68 | Wm. May..... | M. C. Hong. |
| Fourth st., from Norris to Diamond | 3 ft. 0 in. x 2 ft. 0 in. | 552 | 2 | 90 00 | 4 | 23 00 | | | 1,412 96 | Wm. May..... | " " |
| Broad st., from Locust to Sanson. | 3 ft. 0 in. x 2 ft. 0 in. | 731.3 | | | 4 | 23 00 | 1 | 100 00 | 1,998 81 | Jas. McGill..... | " " |
| Charlotte street, from Master to Thompson..... | 3 ft. 0 in. x 2 ft. 0 in. | 447 | | | 2 | 23 00 | | | 1,266 31 | B. E. Hooven..... | " " |
| Third street, from Willow to Calowhill..... | 3 ft. 0 in. x 2 ft. 0 in. | 379 | | | 2 | 23 00 | | | 1,436 93 | A. McGill..... | " " |
| Sanson street, from Seventeenth to Eighteenth..... | 3 ft. 0 in. x 2 ft. 0 in. | 452.5 | | | 3 | 23 00 | | | 1,286 28 | Jas. McGill..... | " " |
| Bayard st., from Seventh to Eighth | 3 ft. 0 in. x 2 ft. 0 in. | 424.16 | 3 | 85 00 | 3 | 23 00 | | | 1,371 63 | B. E. Hooven..... | " " |
| Story street, from Thirty-fifth eastward..... | 3 ft. 0 in. x 2 ft. 0 in. | 152 | | | 1 | 23 00 | | | 392 86 | Geo. I. Djetz..... | " " |
| Twenty-sixth street, from Jefferson to Wright..... | 3 ft. 0 in. x 2 ft. 0 in. | 155 | 3 | 85 00 | 1 | 23 00 | | | 430 65 | { E. Y. Shelmaire..... C. Y. Lauderback..... | M. C. Hong. |
| Mather st., from Ontario to Tioga. | 3 ft. 0 in. x 2 ft. 0 in. | 563 | 3 | 70 00 | 3 | 23 00 | | | 1,372 19 | Geo. Moore..... | Jno. Nolan. |
| Mather st., from Tioga to Venango | 3 ft. 0 in. x 2 ft. 0 in. | 539 | 3 | 90 00 | 3 | 23 00 | | | 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. Feet. | Miles. | Excluding details. | | No. built, size. | Total cost. | Average cost each. | Total cost. | Average cost each. | Total cost. | Cost per foot. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Total Cost. | Average cost per ft. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 48,367.15 | 9.160 | \$122,968 83 | \$2,543 | No. 2, 97 No. 3, 44 | \$8,038 83 3,456 78 | 52 17 | 274 | \$25 89 | 7 | \$430,861 43 | \$7,294 86 | .15 | \$149,328 63 | \$3,087 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2"></th> <th colspan="2">Size.</th> <th colspan="2">Length in feet.</th> <th colspan="2">Average cost per foot including details.</th> <th colspan="2">Average cost per foot including manholes and inlets.</th> <th colspan="2">Average cost per foot including all details.</th> </tr> </thead> <tbody> <tr> <td colspan="2">Egg shaped, 4 feet 0 inches x 2 feet 8 inches.....</td> <td colspan="2"></td> <td colspan="2">1,470.00</td> <td colspan="2">\$4 90</td> <td colspan="2">\$5 08</td> <td colspan="2">\$5 55</td> </tr> <tr> <td colspan="2">Egg shaped, 8 feet 6 inches x 2 feet 4 inches.....</td> <td colspan="2"></td> <td colspan="2">10,847.60</td> <td colspan="2">2 63</td> <td colspan="2">2 77</td> <td colspan="2">3 31</td> </tr> <tr> <td colspan="2">Egg shaped, 3 feet 0 inches x 2 feet 0 inches.....</td> <td colspan="2"></td> <td colspan="2">34,417.80</td> <td colspan="2">2 44</td> <td colspan="2">2 66</td> <td colspan="2">2 94</td> </tr> <tr> <td colspan="2">Egg shaped, 2 feet 6 inches x 1 foot 8 inches.....</td> <td colspan="2"></td> <td colspan="2">899.00</td> <td colspan="2">2 83</td> <td colspan="2">2 50</td> <td colspan="2">3 05</td> </tr> <tr> <td colspan="2">Egg shaped, 2 feet 8 inches x 1 foot 6 inches.....</td> <td colspan="2"></td> <td colspan="2">1,283.25</td> <td colspan="2">2 12</td> <td colspan="2">2 29</td> <td colspan="2">2 51</td> </tr> <tr> <td colspan="2">Total</td> <td colspan="2"></td> <td colspan="2">48,367.15</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> </tr> </tbody> </table> | | | | | | | | | | | | | | | Size. | | Length in feet. | | Average cost per foot including details. | | 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 08 | | \$5 55 | | Egg shaped, 8 feet 6 inches x 2 feet 4 inches..... | | | | 10,847.60 | | 2 63 | | 2 77 | | 3 31 | | Egg shaped, 3 feet 0 inches x 2 feet 0 inches..... | | | | 34,417.80 | | 2 44 | | 2 66 | | 2 94 | | Egg shaped, 2 feet 6 inches x 1 foot 8 inches..... | | | | 899.00 | | 2 83 | | 2 50 | | 3 05 | | Egg shaped, 2 feet 8 inches x 1 foot 6 inches..... | | | | 1,283.25 | | 2 12 | | 2 29 | | 2 51 | | Total | | | | 48,367.15 | | | | | | | |
| | | Size. | | Length in feet. | | Average cost per foot including details. | | 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 08 | | \$5 55 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Egg shaped, 8 feet 6 inches x 2 feet 4 inches..... | | | | 10,847.60 | | 2 63 | | 2 77 | | 3 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Egg shaped, 3 feet 0 inches x 2 feet 0 inches..... | | | | 34,417.80 | | 2 44 | | 2 66 | | 2 94 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Egg shaped, 2 feet 6 inches x 1 foot 8 inches..... | | | | 899.00 | | 2 83 | | 2 50 | | 3 05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Egg shaped, 2 feet 8 inches x 1 foot 6 inches..... | | | | 1,283.25 | | 2 12 | | 2 29 | | 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. |
|------------------------------|----------|-----------------|-------------------|------------------|-----------------|--------------------|
| 1a | 647.3 | \$42.85 | \$27,736 80 | \$27,736 80 | Nov. 3, 1883. | December 6, 1884. |
| 1b | 1,698.0 | 15.90 | 26,998 20 | 20,800 80 | April 26, 1884. | ..... |
| 2 | 2,406.0 | 15.98 | 40,752 00 | 40,752 00 | June 22, 1883. | October 1, 1883. |
| 3 | 3,878.0 | 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 | 8,500.0 | 12.47 | 48,645 00 | 33,519 86 | July 1, 1884. | December 31, 1884. |
| Total..... | 12,563.3 | ..... | \$168,069 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 Corsl street)..... | 3 ft. 4 ins. x 5 ft. 0 in. | * 4,000 ft. | 89 44 | \$41,020 00 | \$41,020 00 | \$5,749 08 |
| | 6 ft. | 88 ft. | 20 00 | | | |
| BROAD STREET (from Dauphin street to Lehigh avenue, with branch on Cumberland street)..... | 5 ft. | 1,088 ft. | 12 43 | 21,889 07 | 17,504 06 | 3,189 18 |
| | 4 ft. 6 ins. | | | | | |
| | 2 ft. 10 ins. x 4 ft. 3 ins. | 1,172 ft. | 6 49 | | | |
| HUNTINGDON STREET SEWER (on Sergeant street, northwest of Ambler, portion rebuilt)..... | 2 ft. 4 ins. x 3 ft. 6 ins. | 265 ft. | 2 83 | 2,165 50 | 2,155 50 | 3,550 93 |
| | 2 ft. x 3 ft. | 182 ft. | 13 50 | | | |
| WEST COCKSINK SEWER (on Dauphin street, from Nineteenth street to Sedgley avenue)..... | 7 ft. | 124½ manholes. | 8 00 | 30,787 45 | 31,829 96 | |
| | 8 ft. x 3 ins. | 1,487 ft. | 22 25 | | | |
| FORTY-THIRD STREET (Sanson street to Chestnut street, rebuilt)..... | 7 ft. x 9 ins. | 376 ft. 5 ins. | 17 80 | 499 99 | | |
| | 4 ft. | 54 ft. | | | | |
| 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 | 34,417.90 | 899. | 1,233.25 | 582. | | 2,113.80 |  | 51,067.75 |
| At private cost..... | ..... | ..... | 1,088. | ..... | ..... | ..... | 591. | 6,791.35 | 8,470.85 | |
| Total..... | 1,470. | 10,347.60 | 35,505.80 | 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..... | 8,470.85 | 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..... | 20 | 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..... | \$9,360 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 | \$11 85 | Wolf & Dougherty. | James Duffy. |
| Total..... | \$99,606 98 | \$64,661 63 | \$1,248 37 | | |

* Estimates Nos. 3 and 4, final, amounting to \$9,866, not yet paid, Controller refuses to approve.