



This material is part of the collection of the  
Philadelphia Water Department  
and was downloaded from the website  
[www.phillyh2o.org](http://www.phillyh2o.org)

Please contact the PhillyH2O webmaster  
for more information about this material.

# 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.**

**PHILADELPHIA:**

**DUNLAP & CLARKE, PRINTERS, HASTINGS' BUILDING, 819-21 FILBERT STREET.**

1884

SPECIAL INDEX		
BUREAU OF SURVEYS,		
BRIDGE DIVISION.		
COMPACT, No.	DATE, 1885.	SHEET No.

# 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 manufactories 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 Cohock-sink 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 Interpeting 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  $4\frac{1}{2}$  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-foot 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  $7\frac{1}{2}$  inches deep, 2 feet 6 inches in diameter,  $\frac{1}{2}$  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  $9\frac{1}{2}$  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  $45^\circ$  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.....	8
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.	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.....	28,724.	13,547.83	579.60	2,491.60	.....	242.	.....	.....	40,385.03
Built at private expense...	1,377.	1,560.50	.....	.....	400.	.....	4,204.	.....	7,541.59
Total.....	24,901.	15,108.33	579.60	2,491.60	400.	242.	4,304.	.....	47,926.53

*Total length of Sewers built in 1883.*

	Feet.	Miles.
Main sewers.....	6,496.	1.230
Branch sewers.....	40,885.03	7.649
Branch sewers, private expense.....	7,541.60	1.428
Total.....	54,422.58	10.307

*Branch sewers built by the City during 1883—Length, sizes, and cost.*

Branch sewers.		Brick and stone inlets.			Manholes.			Inspection.		Amount paid by city in warrants.	Amount paid by property owners in Ass't bills.	Total cost.	Average cost per foot.
Length.	Total cost.	Average per foot.	No. built.	Total cost.	Average cost each.	Total cost.	Cost per foot.						
Feet.	Miles.												
40,385.03	7.649	\$117,723 29	\$2 91.5	20	\$1,422 00	\$71 10	Average cost each.			\$38,900 31	\$91,588 02	\$130,488 33	\$3 23.1

Sizes.	Length.
Egg shaped, 2 feet 4 inches x 3 feet 6 inches.....	23,524.00
Egg shaped, 2 feet 0 inches x 3 feet 0 inches.....	13,647.83
Egg shaped, 1 foot 8 inches x 2 feet 6 inches.....	579.50
Circular, 3 feet 0 inches.....	2,491.60
Circular, 15 inches.....	242.00
<b>Total.....</b>	<b>40,385.03</b>

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.....	3.331
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				
CANAL STREET.....	2 ft. 4 ins. x 3 ft. 6 ins.	1,119 feet.	8 00	\$13,491 46	\$8,992 20	\$526 66	\$17,473 66
MILL CREEK (on Forty-seventh street, Silvertown 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.	89 44	\$13,011 84	.....	\$400 00	\$16,164 80	\$3,152 96
WEST CHOICESINK (on Dauphin street, Nineteenth street to Sedgley avenue).....	.....	.....	.....	2,288 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.	.....	\$103,653 06	\$5,332 51	\$1,746 65	\$112,738 95	\$3,725 36