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ANNUAL REPORT

OF THE

Chief Engineer and Surveyor.

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FOR THE YEAR 1873.

PHILADELPHIA:
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1874.

ANNUAL REPORT OF THE CHIEF ENGINEER AND SURVEYOR.

PHILADELPHIA, *April* 20, 1874.

Hon. WM. S. STOKLEY,

Mayor of Philadelphia.

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

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

Expended as follows:

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

Special Appropriations.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

STATEMENT.

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

STATEMENT—Continued.

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

STATEMENT—Continued.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Work has progressed on three river bridges.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Respectfully submitted,

SAMUEL L. SMEDLEY,

Chief Engineer and Surveyor.