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SECOND

ANNUAL MESSAGE

OF THE

HON. RICHARD VAUX,

MAYOR OF PHILADELPHIA,

TO THE

SELECT AND COMMON COUNCILS;

TOGETHER WITH

REPORTS FROM THE MUNICIPAL DEPARTMENTS,

FOR THE YEAR 1857.



PRESENTED TO THE CITY COUNCILS.

January 8, 1858.

PHILADELPHIA:

PRINTED BY ORDER OF THE SELECT COUNCIL.

1858.

SURVEY DEPARTMENT.

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

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

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

To His Honor, RICHARD VAUX,

Mayor of Philadelphia,

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Respectfully submitted,

STRICKLAND KNEASS,

Chief Engineer and Surveyor.

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

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

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

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

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

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

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

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

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

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

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BY

LEONARD METCALF

AND

HARRISON P. EDDY

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

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

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

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