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Davis, John.

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Vaux, George.

Philadelphia (Pa.). Councils.

In pursuance of the resolution of the Select and Common Councils, passed on the 24th of October, 1811, directing the Watering Committee to cause examinations to be made in relation to an alteration of the present mode of supplying the city with water ... the said committee submit to Councils the following reports.

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Signed on p. 5: By order of the Watering Committee. James Vanuxem, chairman.

"Report of Messrs. Davis and Graff to the Watering Committee of Philadelphia."--p. [7]-19.

Estimates, p. 20-24.

Letter from William Rush and George Vaux, "by order of the Watering Committee, March 10, 1812," p. 25, addressed to Messrs. Henry Nixon and Thomas Biddle.

"Plan of the ground at Morris's Hill, near the upper ferry, proposed to be purchased."--p. [26].

References:

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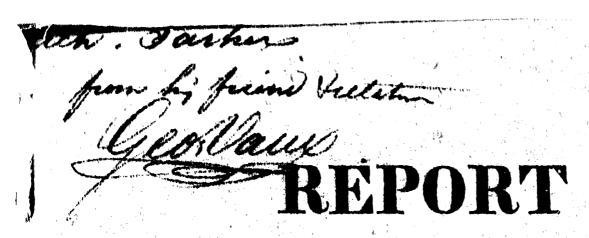
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S26442 Philadelphia. Watering Committee, 1812.

Report of ... Upon the Present State of the Works.

Philadelphia, Aitken, 1812. [1], 25, [1] pp.

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OF THE

Watering Committee,

UPON THE PRESENT STATE OF THE

WORKS

FOR

SUPPLYING THE CITY WITH WATER,

AND

THE SEVERAL OTHER PLANS

PROPOSED FOR THAT PURPOSE.

MAY 2, 1812.

PHILADELPHIA:

PRINTED BY JANE AITKEN, NO. 71, N. THIRD-STREET.

1812.

In pursuance of the resolution of the Select and Common Councils, passed on the 24th of October, 1811, directing the Watering Committee to cause examinations to be made in relation to an alteration of the present mode of supplying the City with water, and also, whether any other mode can be advantageously substituted for that now in operation; the said Committee submit to Councils the following reports.

FOR the purpose of being enabled to lay before councils the most correct information which could be obtained, the committee deemed it expedient to engage the assistance of an experienced engineer, who, in conjunction with the superintendant of the water works, might enter into a minute examination upon the several points embraced by the resolution committed to the committee. With this view they procured, in the month of December last, the attendance of Mr. John Davis of Baltimore, who was formerly the superintendant of the works here, and is at present entrusted with the management of a similar establishment in that City. The practical knowledge and experience of this gentleman as an engineer, and particularly in relation to hydraulic and steam machinery and canals, pointed him out as peculiarly fitted for the objects had in view. From the personal knowledge of some of the members of the committee, as well as from information derived through the most respectable channels, it is believed that the fullest reliance may be placed upon his opinons and estimates.

Mr. Frederick Graff, the superintendant of the Water Works, in whose ability great confidence is reposed, being directed to attend Mr. Davis, they, in conjunction with Mr. William Rush, a member of the Committee to whom the duty was specially assigned, immediately proceeded to execute the instructions of the Committee, by an examination of the works now in operation, and afterwards by an inspection of the eastern shore of the Schuylkill, from the Upper Ferry to the Falls, and thence to the mouth of the Wissahickon Creek, and of the latter stream as far as the dam and mills of Mr. Robeson.

The result of these examinations was communicated in a report, and estimates submitted to the Committee by Messrs. Davis and Graff, on the 18th of December last, a copy of which is hereto annexed; to which report the Committee beg leave to refer, as containing a full statement of all the facts which are necessary to enable the members of the City Councils to form a correct judgment of the plan now in operation, and of the several other modes which have at different times been proposed for watering the City; excepting that by means of the natural head of the Delaware and Schuylkill canal whenever it may be completed. To obtain a supply of water without the aid of any kind of machinery is certainly a most desirable object, and if at all attainable ought by no means to be lost sight of; but upon comparing the levels of the plane of the canal with the levels of the City plat, it will be found that at the most elevated points of the latter, where the present works give a head of more than 35 feet, the head from the canal would be less than three feet, and in other plaso small a head would scarcely be adequate to afford a supply for common culinary purposes, and within a very large proportion of the city would not be sufficient to raise water to a second story, or to pass a stream through a hose for the extinguishment of fire. These considerations induce your committee to believe, that the canal can only be made useful, in supplying the City with water, through the agency which it may have at some distant day in moving hydraulic machinery for that purpose: in any other point of view its probable existence they conceive ought not to be regarded.

On reviewing the report of Messrs. Davis and Graff, it will be found to contain an ample corroboration of the opinion entertained by many of our fellow citizens, that the present plan of watering the City is miserably deficient in the essential requisites of security and economy. So sensible indeed are your committee of the radical defects of the present works, that they believe no alteration or improvement can render them efficient. And when it is considered that if the use of the water should increase for a year or two to come, in the proportion that it has done for the year or two last past, the centre engine will not, even if put into complete repair, be adequate to raise the required supply: they cannot but believe that no time ought to be lost in preparing for the adoption of a better system.

^{*}The bottom of the Delaware and Schuylkill canal, north of the city, is elevated 43 $\frac{92}{100}$ feet above the plane of the highest tides, and the highest point of the city plat, which is in Broad street near to George street, is 43 $\frac{4}{5}$ feet above the same plane, leaving a difference of about six inches in favour of the canal.

Impressed with this opinion, in which it is presumed the Councils will concur, when they shall have fully investigated the subject, your committee have thought it expedient, before submitting their report, to select that mode which appeared most likely to be adopted, in the event of a change, and to endeavour to ascertain whether the site necessary for the works could be procured.

The plan connected with Morris's Hill, near the upper ferry, is considered by your committee as most likely to answer the purposes of the City, in consequence of its combining most of the wished for advantages, and being attainable at an expense comparatively moderate.

The site pointed out as most suitable for the erection of the works at this place, of which a plat is hereto annexed, consists of a square, the sides of which are each 400 feet in length, situated upon the most elevated part of the hill, and surrounded by public streets, and also of an adjoining lot containing 225 feet in breadth north and south, and about 265 feet in length extending westward from the before mentioned square into the Schuylkill. The square contains a broad level, elevated about 90 feet above the line of the highest tides, remarkably well suited to the construction of reservoirs. In the remaining part of the plat is an excellent quarry of stone, which, besides supplying a sufficiency of that material for the construction of the reservoirs and buildings, would furnish an ample store for other City purposes. For the whole plat, the present proprietors after a tediously protracted negociation, have agreed to take a perpetual rent of one thousand

dollars per annum payable half yearly, or the par value of that sum in cash, viz. \$16666 67: at that rate your committee have provisionally contracted for the purchase on behalf of the City. A copy of the letter forming the basis of the contract is hereto annexed.

Should this plan be approved and the purchase be confirmed by the councils, your committee are authorized to state, that the annual rent of one thousand dollars would be more acceptable to the proprietors than the cash price before mentioned. The purchase on rent will also be most convenient to the City, as an increase, to more than double the amount of the sum required to discharge it, will take place after the first day of July next, in the annual income from the water rents, in consequence of a new arrangement of the rates lately completed by the committee.

In addition to the matters contained in the foregoing statement, your committee had given some consideration to a scheme for raising the necessary supplies to carry into effect the Morris Hill plan, in case
its commencement should be determined upon by
the Councils; but as, in this particular, it would be
most desirable to be aided by the experience of the
gentleman whose skilful and judicious arrangements
have for a number of years past so eminently benefitted the financial concerns of the City, and within whose
provin e this branch of the subject would more properly fall, the committee refrain from laying before councils their ideas in this respect.

By order of the Watering Committee.

JAMES VANUXEM, Chairman.

May 2d, 1812.

REPORT

OF

MESSRS. DAVIS AND GRAFF

TO THE

WATERING COMMITTEE

OF

PHILADELPHIA.

GENTLEMEN,

AGREEABLY to your instructions, herewith is presented the following Estimates and Observations, in answer to your inquiries on the state of the works now in operation, and in relation to several other plans for watering the City, viz.

- 1. The state of the engines, now in operation, and the cost of placing them in such repair as to answer the purpose of supplying the City; with the probable annual cost of continuing the same.
- 2. The erection of another engine at the house on the banks of Schuylkill, and the cost of altering and repairing the one now in use there; with every expense attending the alteration, and supplying the city entirely by means of the Engines at Schuylkill.

- 3. The best mode of supplying a reservoir of sufficient capacity placed on Morris's Hill, at the upper ferry; the expense of making such a reservoir and of bringing that mode into operation.
- 4. Whether the water of the Falls of Schuylkill, or the Wissahickon Creek can be made subservient to the purposes of supplying the City without the use or aid of steam engines; with the probable cost of the same: and if the canal already commenced can be combined or made useful in such a plan.

The Committee will please to observe that the answer to the first, second, and third questions, or examinations, are prepared from such data as to render the statements and estimates nearly correct; except the cost of the site necessary for the works contemplated on Morris's Hill. With respect to the last inquiry such observations are stated as the shortness of the time, and present circumstances would permit; but considering the magnitude and importance of the undertaking, if the City Councils should deem it proper to adopt that method of watering the city, a more correct survey and estimate will be advisable, previous to carrying the same into effect.

1st Question—The state of the Engines now in operation, and the cost of placing them in such repair as to answer the purpose of supplying the City; with the probable annual cost of continuing the same.

Owing to the continual working of the Centre Square Engine and the increased quantity of water now delivered daily into the City, the Engine cannot

be permitted to stop, at any time, sufficiently long to repair the most trifling article, or even pack either the pumps or cylinders without depriving the City of water during the period of such business being performed. The consequence arising from wanting time and opportunity for necessary repairs, obliges the persons attending to omit keeping the engine in proper order for the duty it has to perform, and makes the wear and expense much more than they ought to be. It certainly is a most unfortunate circumstance, that when either the Centre or Lower Engine is out of order and cannot work, the City is deprived of water; and likewise that as long as the present plan is pursued the case must be the same, for it is well known both to the Committee and the citizens that there is no security for water in the pipes of conduit one hour, and serious and alarming accidents from fire might happen, when it would be impossible to deliver a single gallon of water into the City. It would be quite unnecessary to mention the above well known facts were it not thought proper to call your attention to the examination and adoption of such plans and alterations as will obviate the above uncertainties, and at the same time diminish the annual expense accompanying the present works. To continue supplying the City on the plan now pursued a very considerable increase of the annual expense must accrue, as is proved by a reference to the expense of the last four or five years. At the Centre Engine a new boiler is indispensable, and if no alteration in the manner of supply takes place, it ought to be immediately commenced, as from every appearance one of the boilers cannot last longer than one year. The pumps at this

place also begin to be troublesome, and from the imperfect manner in which they are constructed, and the increasing supply of water required, in three or four years at most, they must be altered and replaced, and whenever this happens it will produce a very heavy expense. The pump chamber at the mouth of the tunnel will have to be taken up, enlarged and rebuilt; the working barrel of the pump enlarged, and some additions made to the engine. During these alterations the City must be deprived of water for a considerable period. The lower engine wants sundry repairs, as stated in an estimate herewith presented. This engine is in much better order than the centre one, and owing to having the tunnel for a deposit of water, has only fourteen hours employ out of twenty-four to supply the greatest quantity of water yet required by the City. This leisure of ten hours per day enables the workmen to keep the works in repair, and very much lessens the labour of the engine, and unless some very material accident takes place, or repairs are wanted which require more time than above mentioned, there cannot be a want of water to supply the centre engine from this place.

The cost of repairing the centre engine, including a new boiler, as per estimate, is \$6410 00 Ditto, the lower engine - - 920 00

Sum wanted for repairs, \$7330 00

The cost of maintenance and expense of
Centre Engine as per estimate for
1812, - \$9703 00

Ditto, the Lower Engine, \$360 00

18,063 00

Making for repairs and maintenance \$25,323 00

2d Question—The erection of another engine at the house on the bank of Skuylkill and the cost of altering and repairing the one now in use there, with every expense attending the alteration and supplying the City entirely by means of the engines at Schuylkill.

To alter the present plan, and to carry into effect the above, will have many advantages over the one now in use, and although considerable funds will be requisite to effect the same, yet it will certainly be greatly to the interest, as well as the safety of the City to direct and have some alterations made in the present system and whether this plan or either of the following are adopted, it will be easily perceived that it is indispensably necessary something should be done. By erecting another engine at Schuylkill, and altering the one now there; raising the building and placing as large a reservoir as practicable therein at the same elevation with those now erected at the centre house, delivering water and supplying the reservoirs at one lift of the engines, and carrying a main pipe from this house to the distributing chest at Centre Square, and by having both engines at one place, each capable of furnishing a supply of water to the City, will certainly be much superior to the present plan, although it should require one or the other of the engines to be continually at work, yet by having the one in reserve kept in good order, it would very seldom or ever happen that the City could be without water, and much of the present annual expense would be saved. As the defects of the works now in operation are so well understood, perhaps it is not necessary to enter into any investigations beyond those that have been mentioned, as the call of Councils on the

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Watering Committee evinces their knowledge of the subject, and as the answer to the third inquiry appears to have considerable advantage in point of economy, permanency, and certainty of a constant supply of water to the City. It is therefore considered not necessary to make further observations beyond the estimate that accompanies this report.

The expense of these alterations and improvements as per estimate, is - \$82443 96

Annual cost for maintenance of the engines, labour, &c. \$11886 00

Making a balance in favour of the alteration less per annum than the cost of working the engines now, of - 6177 00

\$18,063 00

3d Question—The best mode of supplying a reservoir of sufficient capacity, placed on Morris's Hill at the Upper Ferry, the expense of making such a reservoir, and of bringing that mode into operation.

In examining into the mode of supplying the city with water from this source, it appears to have many advantages of considerable importance to the city. It was found that the surface of the said hill is elevated about eleven feet above the top of the reservoirs at centre square, and presents a very favourable surface for constructing reservoirs of such capacity as may be required or thought advisable, which at all times can furnish as great a supply of water to the city as can

possibly be wanted. The outlines of the plan which it is deemed proper to present to the consideration of the watering committee are, to purchace sufficient ground on the top of the hill for two reservoirs, and a water lot in front thereof on the shore of the Schuylkill river, for the purpose of erecting an engine house to contain a new engine and pumps capable of supplying the reservoirs on the hill, and to carry a main pipe of proper capacity from the reservoirs, and connect the same with the distributing chest at the Centre Square. ter the plan is so far in operation, to remove the engine from the lower engine house, to the new house at Morris's Hill; and repair and fit it up in the best manner with a new set of pumps. The two reservoirs on the hill each to hold 1,000,000 gallons of water, to supply alternately, and one or the other to be always full, either and each of the engines to be made capable to furnish as much water as is necessary for a daily supply. This plan, like the one stated for the lower engine house, will always have an engine and pumps in reserve, as a security from accidents, as well as to enable the works being kept in good repair. Its superiority over the other methods of supplying the city, is in the opportunity of having large and capacious reservoirs, without which no works of this kind can be considered as complete. It is certainly very obvious, that where there is no opportunity of obtaining large reservoirs to supply from, the engine employed to furnish the daily consumption of water, must be kept continually at work, or the stoppage is so short, that no actual saving of fuel can take place, although the engine with nearly half the expense of fuel could perform the whole duty required in half the time, and of course the wear and de-

cay, of both the engines and boilers, would be nearly in the same ratio. By referring to the account of the time employed at both engines as now in use, it will be seen that, while the centre engine is obliged to perform both day and night, the lower engine only works fourteen hours, consequently, producing a saving of ten hours labour and fuel, &c. Now if both the engines are erected at Schuylkill at the lower house, one or the other would have to be nearly constantly at work. Making the most favourable allowance for the reservoirs which can be placed in that building, the engine would be worked twenty hours per day, and the four hours stoppage would produce very little saving of fuel, as the fire could be permitted to be very little checked; while the Morris's Hill plan would certainly save ten hours fuel, with the large reservoirs. Large reservoirs of permanent construction will be much preferable to those made of the best wood, as the latter are liable to decay and of course must be replaced, and likewise present a more certain and regular mode of supplying the City than is possible from small ones. By referring to the estimate prepared, the cost of bringing this plan into operation, is \$148,938 54

And the annual expense of supplying water, fuel, labour, &c. \$8360 00

Making a balance in favour of these works of 9703 00

The expense of the present supply, \$18,063 00

Ath Question—Whether the water of the falls of Schuylkill, or the Wissahickon creek, can be made subservient to the purposes of watering the City, without the use or aid of steam engines, with the probable cost of the same, and if the Canal already commenced, can be combined or made useful in such plan.

With respect to the waters of the Schuylkill at the falls, it appears by the dam erected to supply a mill, now built at that place, there is only four feet six inches fall above tide water, there is likewise a fall of about two feet from the falls, to the tail race of Mr. Robeson's mill, or the mouth of the Wissahickon Creek, making the whole head and fall about six feet six inches, which fall could be obtained by building a dam across the Schuylkill, above the bridge. There is certainly water, and power enough at this place to supply the City with water, if no impediments ever occurred to prevent the operation of the machinery and works, but the certainty of freshets, which so frequently happen in the river Schuylkill, would render such works nearly as uncertain as the steam engines.

From satisfactory information obtained relative to the quantity of water, flowing from the Wissahickon Creek, at Mr. Robeson's mill, it appears that in the driest part of the season the stream produces about 10,000 gallons of water per minute, equal to about 14,000,000 gallons every twenty-four hours. To employ this stream for the purpose of watering the City, the best mode that appears practicable, would be to dig a race, or canal from Robeson's mill dam, to the Falls of Schuylkill, to erect suitable buildings and machinery at the foot of Sims's Hill, and to deliver and

supply into two large reservoirs, on said hill, as much water as is requisite to supply the City, and to lay a cast iron pipe of eighteen inches diameter and connect the same with the distributing chest at Centre Square. There is no manner of doubt respecting the sufficiency of the Wissahickon stream, to give an ample supply of water both to the works and machinery, and deliver from three to four millions of gallons of water in swenty-four hours, to such height on the hill as will produce the same quantity at the Centre Square. The whole head and fall, from the mill dam to high water mark below the falls, is nearly thirty feet, which constitutes a power amply sufficient for the above purpose. The sum necessary to carry this plan into operation is certainly very considerable, but if it was executed in a permanent and simple way, it would perhaps in the end, be the best manner of supplying the city with water. An estimate is prepared shewing the probable expense of the above plan. The cost of the mill seat, land, &c. for the purpose is from supposition, the machinery, pipe, &c. nearly correct.

The amount of estimate is, \$359,718 55

And the probable annual expense of the works and attendance, \$1200 00

If the Canal already commenced should ever be completed, and it is found that a portion of its waters could be spared for the use of watering the City, a water machinery could be erected near to Morris's Hill, to pump or elevate the necessary quantity of water into

reservoirs constructed on the hill as before stated, and if the Morris's Hill plan was at present effected, with the steam engines as mentioned in that plan of supplying the city, all the works of the said plan would be subservient to the canal system, except the steam engines, and the annual expense of the same would be nearly that of the Wissahickon Creek, viz. \$1200 00

In recapitulating the various plans, which are presented to the consideration of the watering committee, the following appears to be the result of each mode of supplying the city with water.—

1st. To continue the supply from the present works, it is found that the annual expense of wear and tear, including new boilers, &c.

Will average, - \$2600 00

Fuel and wages, as per
printed report, for the
year 1812, - 17,310 00

Producing an average an-

nual expense of \$19,910 00

for furnishing the quantity of water now consumed in the city, and as more water is required, and the demand increases, of course the expense of fuel, &c. will be increased, and the city may frequently be without water.

2nd. To adopt the Lower Engine House plan and build another engine, &c. will in all probability, keep always a constant supply of water to the city: the cost

of this alteration will be \$82,443 96, interest of this sum is

Fuel and wages for one year as per estimate,

The whole annual expense would be \$16,832 66

This alteration would produce an annual saving to the City of \$3077 34, and give a constant supply of water.

3d. Removing the works to Morris's Hill, and supplying from two large reservoirs, &c. as per estimate, - - - \$148,938 54

Annual interest of this sum, is - \$8936 31

Ditto the wages and fuel as per estimate, 8360 00

ed with either of the other plans.—

The annual expense at the hill would be - - \$17296 31

If the works and supply were in operation at this place, the actual annual saving at present to the city, would be \$2613 69, and the increase of annual expenses occasioned by the additional quantity of water required for the use of the city, would be trifling compar-

4th. The estimate prepared to effect the supplying from the Wissahickon Creek is \$359,718 55

The annual interest of
this sum is - \$21,583 11
Expense of repairs and
attending the works 1200 00

Making an annual ex-

pense of - \$23,783 11 being an increase of expenses to the city beyond the present annual cost of the works of - \$2873 11

The whole of which is most respectfully submitted by

Your humble and obedient servants,

JOHN DAVIS, FREDERICK GRAFF.

Philadelphia, December 18, 1811.

Estimate of expenses necessary in repairs to the Centre Square and Lower Engines, with the amount of carrying on the works for the year 1812.—

For the Centre Engine will be re	equired	,	
Two cast iron hot wells,	\$200	00	
Repairs to cold water cistern			
and new sills to ditto,	50	00	
A new set of steam and ex-			
hausting valves and place-			
ing ditto,	80	00	
A new 6 inch iron hand pump	1	i.	
for supplying the boilers, &c.	80	00	
	410		1
	410	UU	
With an additional new boil-		· · · · · · · · · · · · · · · · · · ·	
er, one of those now in use			
becoming very defective,	6000	00	•
		onion up	6410 00
For the Lower Engine,	de la companya de la		
Enlarging the air pump,	$\frac{1}{2} \frac{1}{2} \frac{1}$		
condenser, &c.	5 00	00	
Cast iron hot wells,	200	00	
Steamand exhausting valves			week
and placing,	80	00	
Trussing the lower beam—			
the materials on hand,	08	00	
Part of a pump rod—the			
materials ditto,	60	00	
			9 20 00

For carrying	on the	works for	r	1812,	as	per
estimate in	printed	report.				

Centre engine, 22,000 bushels	Of	
coals, hauling and measuring,	7480 00	
Wages of engine men, -	1505 0	
Repairs and materials,	718 00	
· A	Artikonikaspona erikasponaria ponaria propinsi k	9703 00
Lower engine—1000 cords	•	
of wood, hauling, &c.	6500 00	•
,	0000 00	
Wages of engine men,	1142 00	

8360 00

\$25393 00

Estimate of the expenses in erecting a new engine and repairs to the old one at the Schuylkill.

Sinking a new shaft for an additional pump, with the walling and all materials and workmanship included, 1491 06 The building of a new engine, with all the fixtures of cast iron, and on an im-25000 00 proved plan,

One new boiler, with furnace and flues complete,

For raising the engine house thirteen feet, taking down the present roof, and putting on a new one, framing there-

servoirs, and erecting 6 reservoirs sufficient to contain upwards of 80,000 gallons of water, with all materials and workmanship - -

7693 50

For 4340 feet of cast iron pipes of 14 inches diameter, fitting up and laying complete,

34,259 40

For repairing the old engine, with improved pump, enlarged air pump, condenser, &c.

8000 00

----\$82**44**3 96

Estimate of erecting works at Morris's Hill.

Supposed sum required for the purchase of the property of sufficient size for large reservoirs.

15,000 00

For carrying the feeder from the river to the engine house, with all the buildings and pump chamber included

8688 90

For erecting two reservoirs sufficient to contain 2,000,000 gallons of water, with the enclosures included,

8000 00

For 9704 feet of 14 inch iron pipe fitting up and laying - 76,249 64

For a new and improved 42 inch cylinder steam engine 25,000 00

One new boiler for ditto

6000 00

For removing the lower engine and boilers, with repairs

10,000 00

-\$148,938 54

Estimate of erecting works at Sims's Hill at the Falls, supplying the same by a race to be taken from the Wissahickon, with the purchase of Robeson's Mill and ground for the race, &c.

for the buildings necessary

for the works with a seat for
the same, \$20,000 00

Supposed sum required for the
purchase of Robeson's mill
ground for the race and reservoirs, - 74,000 00

For making the reservoirs, &c. 10,000 00

For 25080 feet of iron pipe of
eighteen inch diameter, fitting
up and laying complete. 255,718 55

-\$359,718 55

Recapitulation of the foregoing Estimates, shewing the Annual expense of each Plan.

Expense attending the Working of the Centre and Lower Engine in their present situation, \$18063 00

Expense with two Engines in the Lower Engine House, - \$11,886 00

Expense with two Engines at Morris's Hill, \$8360 00

Expense with Water Machinery at the foot of Sims's Hill, - - - - - \$1200 00

Messrs. Henry Nixon and Thomas Biddle.

GENTLEMEN,

IN consequence of the variation of the plat suggested by Mr. Biddle, on Saturday last, we have had a new measurement and examination made of the ground, and are now prepared to state to you, as a definitive proposition, the following, viz.

The Corporation of the City to give for square No. 24 and a strip of 200 feet in width (north and south) to extend therefrom and to adjoin the north side of Morris street, into the Schuylkill, an annuity of \$900, or the sum of \$15000, in cash, or to give for square No. 24, and a strip 225 feet in width, to extend as above mentioned, an annuity of \$1000, or the par value thereof in cash.

The annuity in either case to be redeemable at the pleasure of the City, after the expiration of 5 years, at its par value, and the present proprietors to retain the right of quarrying in all the streets of the plat, excepting that part of Bridge-street, which is east of the 200 or the 225 feet with which no interferance is to be made without the consent of the Corporation.

With great respect, &c.

WM. RUSH, GEO. VAUX.

By Order of the Watering Committee.

March 10, 1812.

The proposition printed in Italics is that which is accepted.