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WATER WORKS

FOR THE

CITIES OF THE DISTRICT

WITH

EXPLANATORY REMARKS:

ALSO

L E T T E R S

FROM

ROBERT MILLS, ESQ., ARCHITECT AND CIVIL ENGINEER,

AND

HON. FRANCIS O. J. SMITH, OF MAINE.

John C. Fr. Solomon

WASHINGTON:

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1854.

MEMORIAL TO CONGRESS.

To the Honorable the Senate and House of Representatives of
the United States of America in Congress assembled.

JOHN C. FR. SALOMON, by his Memorial:

RESPECTFULLY REPRESENTS:

That he is the author of a plan for supplying the cities of Washington and Georgetown with pure water, the surveys and estimates for which he made at his own private cost, and at great expense of labor, time, and money; that at the first session of the Thirty-second Congress (before the Government acted in the matter) he filed a memorial, praying that himself and his associates might be incorporated into a Company for the purpose aforesaid, under the name and style of "The Washington and Georgetown Water Company;" that said memorial was sustained by the petition of more than five thousand respectable inhabitants of the two cities; that it was referred to the Committee on Public Buildings in the House, and was unanimously approved; that it was subsequently referred to the Committee on the District, being deemed more properly in their province, and also met their unanimous approval, but at too late a period in the session to report a charter as prayed for.

Your memorialist proposes to draw the water by *iron mains* from directly below the Little Falls of the Potomac to Mason's Foundry, above Georgetown, (or some other suitable site,) and thence to force it, by hydraulic machinery, to the highest point above Georgetown, 382 feet above tide, and 142 feet above the apex of the dome of the Capitol, thus giving it a sufficient "head" for manufacturing purposes, for a dry dock, for fountains in the public grounds, and for supply of the public buildings, for public and private baths, for cleansing the streets, for sewerage, and for general distribution to the citizens of the two cities, affording to *each* inhabitant, if required, at the present population, three hundred and sixteen gallons per day, being more than three times as much as is supplied to any other city in the world.

Your memorialist believes his plan (which resembles the famed Fairmount Water Works) to be the best and most economi-

cal yet offered to your honorable body for the purposes aforesaid, as affording the most abundant, unfailling, and purest water supplied in quantity, capable of indefinite increase, and at a rate as cheap or cheaper than is afforded to any other city. All of which is fully set forth in the accompanying documents.

In view of the more economical and speedy construction of his plan over any other submitted to your consideration, and as the works, reservoirs, mains, &c., which he may construct and put down can all be turned over to the Government, at a fair valuation thereof, at any stage of their progress, or on the completion of their aqueduct to the site of his proposed works, (if they determine to go on with their aqueduct at the enormous expense it will entail,) and in consideration that the inhabitants of the two cities may be supplied with pure water at the earliest possible period, he is induced to renew his application to your honorable body, and again ask a charter for a Company as aforesaid, to be formed by himself, (and those whom he may hereafter associate with him,) with a capital stock of \$1,000,000, that sum being amply adequate for all the purposes aforesaid. Should you deem a charter as prayed for inexpedient, your memorialist would suggest that, if you adopt his plan, he will undertake the execution of the works according thereto, and for the amount aforesaid, and in the time stated, under such restrictions and guarantees as you may deem just and proper. And he further prays, that the memorial heretofore presented to your honorable body by himself (and associates) may be cancelled, and this memorial substituted therefor.

All of which is most respectfully submitted.

JOHN C. FR. SALOMON.

WASHINGTON, January, 1854.

REMARKS.

After selecting a source from whence to supply pure water, the next great object to be obtained is a propelling power, of sufficient force, for *all* the purposes required. This can readily be acquired from the Potomac, through hydraulic machinery, by which water can be forced from the river to the heights of Georgetown into reservoirs 382 feet above low tide, through conduit pipes, to an elevation 142 feet above the summit of the Capitol, or of any building in

the District. The conduit pipes, descending from the heights, will conduct the water with impetuous velocity to any points required in either city;—in Washington, to the Capitol, the President's House, the Executive and Post Office Departments, the Smithsonian Institution and grounds about it, the Penitentiary, Jail, Navy Yard, Arsenal, Observatory, Infirmary, Court House, and to buildings and works of corporate associations, to public reservations and squares, for fountains and for utility, and to the residences of the citizens generally. In the promotion and preservation of health, the water may be used for sewerage, and for cleaning the streets and alleys, keeping them free from dust, and for public and private baths. It may also be used for supplying a dry dock, should Government construct one, and for propelling machinery at the Arsenal and Navy Yard; besides, from the immense "head" it will possess, it will render the ordinary fire apparatus almost, if not entirely, useless—placing it in the power of the inmates of all buildings speedily to extinguish a fire, and making impossible the recurrence of such terrible conflagrations as heretofore destroyed our public buildings and archives, works of art, of science and of literature, and the dwellings of citizens, reducing many to ruin.

We consider the Potomac is the best, because the purest and *most abundant*, of the sources yet proposed in any plan, and as pre-eminent in advantages for the application of hydraulic power, (consequently cheapest,) as inexhaustible and always reliable, always available and applicable, and capable of facilities and improvements that will furnish a supply of water adequate to *all* demands—ever ready, free from accident, and perpetual, unless stayed by some violent convulsion of nature.

London is watered by different companies, and from various sources, with the use of steam power, at great expense. So also with Paris. New York is supplied by the Croton from its own propelling force, and the cost of the works was enormous. The Potomac river is capable of furnishing a supply *greater than is afforded to all these cities combined*, and at *far less expense than is incurred by either of them*. As gauged by Major Ewing, of the U. S. Board of Engineers, in September, 1839—a very dry season, there having been no rain for several weeks, and the gauging being done below the Little Falls and *below the feeder of the Canal*—the Potomac was ascertained to flow 114,240 cubic feet *per minute*—at 6 gallons to the cubic foot, gives 685,440 gallons *per minute*, or

41,120,400 gallons per hour, or 987,033,600 gallons in twenty-four hours.* Showing that by Salomon's plan the cities of Washington and Georgetown would be the best watered cities in the world!

After having carefully examined the surveys and sites heretofore made and selected, (disclaiming any invidious reference to any of the parties concerned therein,) we cannot but give our preference to the Potomac, and to a site thereon immediately above Georgetown, as affording the *best* and the *cheapest* means, and with the greatest amount of projectile force, for the supply of Washington and Georgetown with water at the *highest* rates of *power* and *abundance*, as before estimated.

The springs in and about Washington are incapable of affording the quantity wanted. The "Eastern Branch" would require the constant expensive use of steam power; and "Rock Creek" is inadequate and not reliable, the mills thereon being frequently compelled to stop for want of water; whereas, at or about Mason's Foundry, just above Georgetown, all the required hydraulic power is attainable, and all the flow of the Potomac at command, to furnish and force the water in any quantity to the extreme highest point—142 feet higher than the top of the Capitol.

OBJECTIONS have been made to the use of iron mains, or pipes, on the score of *rust*, and of tubercles and accretions, which sometimes form within them. The rust can readily be prevented in various ways—by an external coating of asphaltum, by whitewashing, by coal tar, by laying the pipes in charcoal, by a covering of hydraulic cement, &c., &c. Tubercles and accretions *cannot* form within them when the water flows with great rapidity, and their formation is easily prevented, either where the flow is fast or sluggish, by coating the *interior* of the pipes with hydraulic cement in the manner of "Ball's Patent Indestructible Water Pipe." By this plan thin sheet iron has been successfully used, and being coated internally and externally to the thickness of three inches, (each,) the pipe, after being seven years in the ground, and the cement broken off with hammer and chisel, had all the appearance of new stove pipe. In this method the sheet iron is merely a foundation or basis for the cement, which becomes hard as stone.—See pamphlet—*Ball's Patent Water Pipe: New York, Baker, Godwin & Co., 1853.*

* This calculation is made by imperial gallons; by our (United States) measurement a cubic foot contains a fraction over $7\frac{1}{2}$ gallons; therefore the amount in gallons would count much more by our measure.

By the Aqueduct plan *iron* pipes will also be indispensable in the streets, unless resort is had to the more costly method of using Earthen pipes, on the ancient plan of the Egyptians, which is still in use in some parts of Asia, and in Buenos Ayres and other places on this continent. The best conduits are made of Glass, but the cost of them is great, and they are but little used, except among the wealthy in England.

The iron pipes which were laid down in Cincinnati some *thirty* years ago are now being taken up for the substitution of others of larger calibre, to supply the wants of an increasing population. Robert Semple, Esq., an extensive iron master of that city, who has had cast twenty miles of pipe in the last few months, informs us that he found the old pipes free from rust externally and internally, and their calibre in no way impaired by any tubercles or incrustations whatever. He is melting them down to make larger ones, which are whitewashed before laying them. The aqueducts of antiquity have been referred to, and appeals have been made to our national republican pride, to stimulate us to compete with works of the kind by the tyrants Claudius and Caligula, of old Rome. But in this age of progress, Appian ways have given way to railways, and, as Webster says, "Aqueducts have been superseded in a great measure, in modern times, by pipes following the inequalities of the ground, and conveying the water on the principles of hydrostatic pressure."

The waters in all aqueducts are liable to great impurities from their exposure. In the Croton Aqueduct dead bodies of men, women, and babies, carrion dogs, and other disgusting nuisances, are of frequent occurrence, and propositions are now being considered for laying iron or other pipes in the aqueduct to avoid the collection of impurities. In nearly all the hotels and better private houses in New York, "Jennison's Water Filter," (or some other medium,) is screwed to the nosles of the hydrants to strain the water.

When water is kept in constant agitation by pumping, and forced to gurgle through pipes of iron, it must, of course, be sweeter, purer, and more healthy than the less active or sluggish water of an aqueduct. The *estimated* cost of the Croton Aqueduct was \$9,000,000—its *actual* cost \$14,000,000. The lowest cost of the proposed Washington Aqueduct is (as estimated by its projector) \$2,300,000; the interest on which, at six per cent per annum, is \$138,000, to say nothing of keeping the works in repair. The esti-

mated cost of Salomon's plan is \$1,000,000; the interest on which is \$60,000. But able and experienced civil engineers estimate the cost of the Washington Aqueduct at not less than \$5,000,000, and from that to \$7,000,000, and the Government engineer who surveyed and estimated it admits that he "had but three months to survey, devise, project, and estimate three great works, either of which is well worth the study of a year."*

From this admission it cannot be presumed that either his surveys or estimates are particularly accurate. The same engineer asks the following pertinent question: "Suppose a great flood to make a breach in the Croton Dam, or a water spout among the hills to wash away one of the bridges or culverts on the line of the Aqueduct, in what condition would New York find herself?"†

We ask, suppose a similar circumstance should occur to *our* Aqueduct, *where would Washington find herself?* The Government Engineer also, with great candor, admits (in his Report, page 36) that "My studies, until this duty was assigned me, had been turned in a different direction. I could point to no great work whose construction by myself would give me the right to speak with authority on such a subject." With such acknowledgments before us, how can we confidently rely on his surveys, his estimates, or his works? But we will not further notice his Report, its contradictions, and incongruities, but refer the reader to the document itself, and let him, if he can, reconcile its inconsistencies, for we cannot.

Professor Salomon's plan was *surveyed, estimated, and proposed*, (before the Government surveys were made,) at his individual cost, consuming the time of himself and assistants for more than a year. It is similar to that of the Fairmount plan, but possesses the great advantage of having *thirty-five feet fall of water* for working the wheels or turbines; whereas the Fairmount works have but *eight feet fall!* The expense of those works, (see Philadelphia Water Report, 1853,) for the *water works alone*, (not including salaries of officers, &c.,) is but \$7.50 per day for wages, repairs of machinery, and all work appertaining to the pump house, and an average of 4,785,338 gallons is pumped up daily, at the cost of about \$1.61 per million of gallons!

By Salomon's plan the supply of water will be vastly greater than

* See Captain Meigs' Report—Senate Ex. Doc. No. 48, 32d Congress, 2d Session, page 30.

† Ibid, page 15.

at the Fairmount works, and the expense proportionably less. If the charter (which asks but ordinary privileges) is granted, as prayed for in his memorial, the work will be executed without taking one cent from the public coffers. If the charter is not granted, but his plan adopted, it will save *at least* \$1,300,000 to the Government Treasury.

Many persons favor the "*Aqueduct Plan*," not that they esteem it the best, but because it will involve the expenditure of a vast sum of money in the District. If it is so very desirable that a vast sum should be expended in the District, it is perhaps equally desirable that it should be expended judiciously. We have shown how \$1,300,000 can be saved to the Government, and yet the people of the District be supplied with pure water sufficient to inundate and drown their cities. We would now suggest how the \$1,300,000, if so saved, may, as we think, be judiciously expended. Three hundred thousand dollars would construct in the District the buildings for a *National University*. The *interest* of the remaining million (sixty thousand dollars) would support twenty professors, at a salary of three thousand dollars per annum each. From this University streams of knowledge would flow for ages and centuries to come, gladdening and brightening all the land, and the Institution would ever remain an imperishable monument to the glory of its founders.

[FEB. 14, 1854.]

N. B.—Since writing the foregoing, we learn that there is remaining in the Treasury about forty thousand dollars to the credit of the "*Aqueduct Plan*." It may be asked, is it not better to save this sum, and sell off the materials collected at the Great Falls, than to expend it and use the materials upon a most costly and doubtful project, which may entail vast expenses on the Government for many years to come?

[The writer of the following letter was formerly Engineer of the Baltimore Water Works, and Architect of the Washington Monument in that city, besides many other elegant public structures. He originally preferred the Rock Creek Plan, but, on examining Salomon's Plan, he at once admitted its superiority over all others. His well known integrity, ability, and experience give weight to his testimony: and, he is one who CAN, "point to great works whose constructions by himself give him the right to speak with authority on such a subject."]

CITY OF WASHINGTON, D. C.,

January 26, 1854.

PROFESSOR SALOMON :

DEAR SIR,—I have carefully examined your Plan for supplying an abundance of water to Washington and Georgetown, and give it a decided preference to either Rock Creek or the great Falls plan.

This opinion is founded on its great *economy* compared with the *cost* of the latter Plan, and of its superior efficiency to the former in the supply of water. The *simplicity* of your Plan is one of its greatest recommendations, as exempting it from the evils to which a *long line of aqueduct* is subject. The great difference of time in the completion of your Plan, compared with that required for the Great Falls Plan, is of serious import to the interests of the City, and of Government, connected with the safety of their buildings from fire. By your Plan the waters may be brought into the City in less than *two years*; whereas, by the Great Falls Plan, it would require from five to six years. Independent of this *economy, and time*, there is an *evil* that is to be apprehended in the execution of the Great Falls Plan that has been experienced in the Croton Aqueduct—namely: Its liability to accumulate nuisances, as have occurred in the latter, which were of a disgusting character, and the exposure of the water in such aqueduct to the entrance of various insects, tadpoles and such like, that have compelled the families that use this water in New York to pass it through a medium (a sponge) before using it. The Philadelphia water-works are free from this evil, and you have properly adopted the system of these works as the ground of your Plan.

There is another objection to the *Aqueduct* Plan which the New Yorkers have found out, and are preparing at great expense to rectify; it is the apprehension of being *cut off* from the Aqueduct supply by floods, and thus proposing building *other* receiving Reservoirs to meet such a contingency.

And such an evil the Great Falls Aqueduct would be liable to in a far greater degree, because the Croton is an *inland stream* with little comparative *flood power*, whereas the *Potomac* above the *Great Falls* is a mountain torrent, which nothing human can at times resist. Upon your Plan, you have wisely placed your machinery operations, in a measure, above these floods, and need not apprehend such evils.

Independent, however, of these considerations, and as your Plan is capable of providing *equal facilities* with the Great Falls Plan in furnishing the abundance of waters, it should be preferred upon the ground of *economy*, as the difference in the final cost between the two Plans will be as *one to six*, for your Plan will not cost more than *one million of dollars*, and the Great Falls Plan, taking as data the cost of the Croton Aqueduct, (which for difficult work bears no comparison with this,) will, pro rata, cost at least *six millions of dollars*.

Respectfully,

ROBERT MILLS,

Engineer and Architect.

[The letter that follows is from a well known personal and political friend of President Pierce—a gentleman to whom, next to the inventor, the world is indebted for the early practical development of Prof. Morse's great invention.]

FOREST HOME, NEAR PORTLAND, ME.,

January 28th, 1854.

MY DEAR SIR :—I am this day in receipt of yours of the 25th inst., but for reasons it is unnecessary for me to speak of here, I have ceased to obtrude any opinions of mine upon the President, altho' I think his heart is as near as ever in its right place, as a man.

In respect to your project for supplying the City of Washington with pure water, I have not, in any particular, changed the views I expressed in my letter to the President, to which you refer.

I think even at the same cost with that of Capt. Meigs, it would be *eminently preferable*, while in point of cost it is less than half the magnitude.

But, where expenditure is made a passport for folly, economy ceases to be an element of influence over the judgment, and so one of the chiefest merits of your device serves rather as a stumbling block than helpmate in your way. And *I predict* that, after the \$2,300,000 shall have been expended in a spirit of personal favoritism by government officers upon Capt. Meig's scheme, or its similitude, and the want shall then have been realized of that difference in utility between having a supply of water at command, at an elevation of more than 100 feet above the apex of the Capitol, and having it only at a point of little less than that number of feet below the same elevation, some *civilian* of practical and utilitarian sense will be called in to spend another half million of dollars to carry into execution, substantially, your recommendations—although you may in the meantime be starved into the grave with nothing, perhaps, to console you but the prospective of a posthumous glory. Such is often the strange turn of human affairs, and makes us almost converts to the poetical ethics that teach us to believe—

—“Thus chance and lot
Are sacred things—thus dreams are verities.”

I am sorry, my dear sir, to write you thus discouragingly, but I esteem the merit of your labors too much, and sincerely, to throw around it an illusory sunshine of hopes, when I know so much of clouds and darkness, and of opposing elements, encompass it. But, if I could redeem it in triumph, cheerfully would I do so. I expect to visit Washington for a few days—in all February next—when, if it can be in my way to serve you, I will freely—and any opinions I entertain on the subject are always at your service, in the uses you may elect to make of them.

I have forwarded to you by express the Bridge and Railroad plans you requested, and will the map; if found.

Most truly, your obedient servant,

FRANCIS O. J. SMITH.

Prof. J. C. FR. SALOMON.

Washington, D. C.

[The following note is in reply to one requesting leave to publish the foregoing.]

FOREST HOME, NEAR PORTLAND, ME.,

February 9th, 1854.

Dear Sir:—I am on this P. M. in receipt of your letter of the 7th instant. I am glad to hear that Prof. Salomon is being so well fortified in the matter of the Washington Water Works, by the preferences of skilful minds brought to bear upon the subject.

Apart from the success which the earnest life and toil of the man ought to secure him, when clearly surpassing his competitors, the water works of the City of Washington constitute a subject of *national* interest and *national* pride, and therefore may well engage the reflections, and invite the opinions, of citizens of the Union generally, without justly exposing them to the reproach of intermeddling with a mere local or municipal affair. However, from both considerations, I have felt free to respond with my own opinions to Prof. Salomon's request, and I can entertain no objections to his making any use of this, or my former letter, either publicly or privately, as his judgment may dictate.

Very respectfully, your ob't. serv't,

FRANCIS O. J. SMITH.

LEWIS F. THOMAS, Esq.

Washington, D. C.

NOTE.—In the reference in the accompanying Map, the letters A1. A2., refer to a line of mains, or Conduit, for the water by Salomon's plan, and not to the proposed Government "Aqueduct."