REPORT OF THE COMMITTEE ON WATER WORKS.

To the Board of Trustees of the Village of Ogdensburgh:

GENTLEMEN: The undersigned committee appointed under resolution adopted at a meeting of the Board held on March 5th, beg leave to report that immediately after their appointment they employed a competent engineer to make the necessary surveys and estimates for furnishing the city with an adequate supply of water.—At the same time they requested the agent for the Holly Manufacturing Company, to telegraph to Mr. Holly, then at Saratoga Springs, in answer to a call of the citizens of that place in connection with contemplated water works, to come here for the purpose of informing our citizens in relation to the probable cost of supplying our city with water, both for domestic purposes and protection against fires.

T. T. Flagler President, and B. Holly Mechanical Superintendent, arrived here on March 27th, and were met by the committee and conveyed about the city, and made acquainted with the elevation of the land the capacity of the water power, height of the fall and the location of the sources of supply.

In the evening they met a number of the leading citizens of the city at the Trustees' Room, when Mr. Flagler explained at length the principles of the Holly plan of supplying cities and villages with water works, the efficiency of their machinery as an engine to combat fires, and the required power to make it sufficient for all purposes. They also answered many inquiries propounded by those present. Before leaving they made out at the request of the committee the following estimates for water works:—

Messrs. Flagler & Holly's Estimate for Water Works at Ogdensburg, March, 1868.

1st. Works to be erected at the east end of the dam, and wheels to be placed under ten feet head.

Cost of water power	$6000
Fire proof and frost proof building and foundation for machinery	5000
One complete set of Holly Co's machinery, combining duplicate water wheels and pumps, and also regulators, pressure guages, fire alarm, and other fixtures capable of supplying two million of gallons of water daily, or every twenty-four hours, and when run at increased speed for fire protection, to throw six powerful streams, each eighty feet high at sixty feet elevation above pumps.—	13,500
Freight on machinery and putting up same	2,500
Excavations, building walls, bulkhead, millwright work, masonry, &c.	3,000
Pipe, 3,300 ft. 10 in. @ 1.50, $4,950	
" 2,000 " 8 " 1.20, 2,400	
" 6,000 " 8 " 1.00, 6,000	
" 21,000." 4 " 60, 12,600	
50 single hydrants at $40, 2,000	
25 double hydrants at $45, 1,125	29,075
	$59,075
Add freight on fifty tons pipe from ——— to Ogdensburgh, laying 32,300 ft. pipe at	
Setting seventy-five hydrants	
Cost of extra water wheel to provide for the contingency of reduction of the head to five feet	
Cost of engine to be used to operate works in case of the water being drawn off for repairs, &c.	
Estimate cost per annum of operating the same	

Estimate of Water Works to be propelled solely by steam power, to be located on the St. Lawrence River.

The Holly Manufacturing Co. will furnish a set of works similar to that in process of construction for the city of Binghamton, and capable of producing the same results as machinery in estimate No. 1, for the sum of	$25,000
Building as before	5,000
Freight and putting up machinery	2,500
Pipe same as before	29,075
	$61,575

It is understood that the Holly Co. only guarantees the preceding estimates so far as they relate to the machinery that Company furnishes. The balance is founded upon information which is supposed to be reliable.

If preferred, the Holly Co. will furnish competent workmen to put up machinery, at $5 per day and expenses, and charge actual freight on machinery instead of the sum of $2,500 for freight and putting up machinery.

The estimate for pipe covers a distance of nearly seven miles and would be sufficient to so disseminate the water as to bring almost the entire settled portion of the city within the water limits. It will be observed that no estimate is made for the cost of laying pipe or setting the hydrants.

After receiving these estimates the committee directed the engineer to proceed with his surveys and estimates for water works to be supplied from a reservoir to be located on Lime Kiln Hill, in the Second Ward, and also for supplying water works on the Holly plan with everything in complete working order, and on the 13th of April received the following:—

OGDENSBURG, April 13th, 1868.

Approximate estimate for supplying the City of Ogdensburg with the St. Lawrence water, by pumping with steam power into a reservoir to hold 2,000,000 gallons, at a head of 110 feet above the St. Lawrence at low water, giving for distribution a head of 78 feet at the corner of Ford and State streets, and a head of 52 feet at the Methodist Church, corner of Montgomery and Caroline streets.

The water to be forced by a 20 h. p. engine, working two double acting pumps, through a ten inch main to the reservoir, situated on the high ground directly back of the ship-yard and at a distance of about 2,000 feet from the pumps, and distributed to the town by a ten inch pipe branching from the reservoir main where it intersects Main street, thence along Main, Lake and Ford streets to Patterson street, and from thence to Pero lane by an eight inch pipe. Laterals of eight inch pipe to run North and South up Morris and Caroline streets to Water street and Jersey Avenue; and from Main up New York Avenue to Grove street, and an allowance of 4,000 feet of six inch laterals.

ESTIMATE.—PIPES.

Length of pumping main from end of ship yard wharf to centre of reservoir	Ft. 2,600,	10 inch
From intersection of Marine and Main, along Main and Ford streets to Patterson street,	Ft. 8,600,	10 "
Total, 10 inch,	Ft. 11,200	
Patterson street to Pero Lane,	Ft. 1,400,	8 "
Water st. to Jersey Avenue, on Morris st.,	" 3,800,	8 "
Water st. to Jersey Av'ue, on Caroline st.,	" 3 800,	8 "
Main to Grove st., N. Y. Avenue,	" 2,400,	8 "
	11,400	
Allowance for other laterals	Ft. 4,000,	6 "

Making a total of:

	Lin. ft.	lbs.	Tons	lbs.
10 inch pipe,	11,200 @	55 per foot =	306	of 2,000 each
8 "	11,400 @	45 " =	256	"
6 "	4,000 @	30 " =	60	"
	26,600		624	
Add 10 per cent. for bends, T pipes and waste			62	
			686	Tons.

686 tons at $60 a ton,	$41,160 00	
Coating inside do. with tar varnish at $2 per ton	1,372 00	
Freight on 686 tons, at $6 per ton	4,116 00	
Distributing do. to place, at 50 cts. a ton	343 00	
		$46,991 00

SINKING PIPE AND LAYING.

Opening and refilling trench, pipes to have 5 feet of earth over them, to include ramming, &c., 26,600 lin. feet, at 25 cts. a foot	$6,650 00	
Allowance for rock encountered	500 00	
Laying pipe, including all labor, gaskets, &c. (but not lead), 26,600 ft. at 10 cts. a foot	2,660 00	
Lead	800 00	
		$10,610 00

HYDRANTS AND VALVES.

Twenty Double Hydrants, including freight and fixing complete, at $75 each	$1,500 00	
Eight stop cocks, at $75 each	600 00	
One reflux valve and air vessel	150 00	
Air valves, securing locks, &c.	300 00	
		$2,550 00

OSWEGATCHIE CROSSING.

Crossing under Oswegatchie Bridge, 250 feet, at $2 a foot	$500 00

ENGINES, &c.

One 20 h.p. Engine, with boiler, pumps, air vessel, fly-wheel, and gearing complete	3,500 00
Engine house and well	2,000 00
Reservoir, as per annexed statement,	16,000 00
Land and damages	2,000 00
Superintendence	2,000 00
	$86,151 00
Add 10 per cent. for contingencies	8,615 00
Grand total	$94,766 00

ESTIMATE

For Circular Reservoir, to hold 2,000,000 gallons; depth of water 26 feet; head over the St. Lawrence at low water 110 feet; width of bank at top 12 feet.

*Total excavation	5,200 yards,	@	20c.	$1,040 00
Embankment	23,500 "	@	30c.	7.050 00
Puddle	5,200 "	@	75c.	3,900 00
Pitching	1,200 "	@	2 00	2,400 00
Gravel	450 "	@	1 00	450 00
Sodding	3,200 sup.yds	@	25c.	800 00

*This goes into embankment and is then paid for, 30c., making a total of 50c.

ESTIMATE

Machinery, buildings, &c.,		$32,500 00
3,300 feet 10 inch pipe 2,000 " 8 " 6,000 " 6 " 21,000 " 4 " } = 450 Tons.		
450 Tons, @ $60	$27,000 00	
Coating with tar inside, 450 tons @ $2	900 00	
Freig t, 450 tons @ $6	2,700 00	
Distributing, 450 tons @ 50c	225 00	
		30,825 00
Opening and refilling 32,300 lin. feet of pipe @ 25c	$8,000 00	
Laying 32,300 feet pipe @ 8c.	2,584 00	
Lead	800 00	
Allowance for rock	500 00	
Crossing Oswegatchie	500 00	
		12,384 00
50 Single Hydrants @ $75	$3.750 00	
25 Double do @ $80	2,000 00	
Stop cocks, valves, &c.,	1,000 00	
		6,750 00
Superintendence and lands		4,000 00
		$86,459 00
Add 10 per cent.		8,645 00
Total		$95,104 00

Pumping from East end of Dam will be $2,500 less.

Upon the request of the committee Hon. W. C. Brown, who has taken a great interest in the contemplated water works, on the 13th of April wrote to the Holly Company for additional particulars in relation to their works and plans, and received the following reply:—

HOLLY MANUFACTURING CO.,
LOCKPORT, N. Y., April 18, 1868.

Hon. W. C. Brown:

DEAR SIR: Enclosed please find answers to inquiries propounded in your letter of the 13th inst. The statements made in your place were very hastily prepared, and we gladly avail ourselves of the opportunity you give us to send you additional and more definite information on the subject of your projected water works. If you construct work this season no time should be lost in contracting for your pipes. I inclose circular of a Cincinnati Manufacturer. We are advised that William Smith, a pipe manufacturer in Pittsburgh, offers pipe at $54.50 per ton. I suggest correspondence with them. We this morning, received orders from Binghamton for their hydrants, sixty in number. These were not in our original contract, but are now ordered of us after careful examination and comparison. The machinery for Binghamton is nearly finished and to be shipped on opening of the canal. We should be pleased to have you see it before shipment. If you secure the needful legislation we should hope to see, at an early day, representations of your community.

And ever, yours truly, T. T. FLAGLER.
President.

Statement in Answer to Inquiries Relative to Water Works at Ogdensburg.

First Question.—As to the building which you estimate at $5,000, what should be its dimensions, height and number of stories, and nature of protection against frost?

First Answer.—STEAM WORKS.—The building should be 30x50 and 20 feet high, and may be built of brick, stone or wood. There should be solid foundations inside to set the works on, but no joice required, except for roof, but some heavy timber will be required above to aid in placing or moving machinery.

It may be all in one room, unless you see fit to place a partition between boilers and engines. As quite a bill of cut stone, probably from $500 to $700 worth, will be required to set engines and machinery upon, you will perceive that the cost of any suitable building will be fully $5,000; and if you want to add for appearance, you will be obliged to expend more. In steam works the fire to make steam will protect against frost.

Second Answer.—WATER WORKS.—The building should be about 28x35, and of either brick or stone.

If of brick it would be well to build hollow wall; should have good flue to set up a coal stove to guard against frost in very severe weather. The lower story should be 14 feet high and the upper story should have accommodations for a family to live in, or if this is not desired by you, at least for a man to sleep in at night. This last may be dispensed with if you have any small building near by where the person in charge can sleep.

We think for water works the building can be erected for from $3,000 to $3,500, unless you desire to incur additional expense for external appearance.

Second Question.—"Freight on machinery and putting up the same you estimate at $2,500. How much do you estimate as the cost of putting up the machinery and what in general terms is included in that?"

Second Answer.—Putting up the machinery is intended to include receiving it at your building, putting it together in complete working order, and testing it with reference to fulfilling the guarantees we make.

We think we can do this for $1,000 for water or for $1,500 for steam. We will give you the option to pay $5 per day and expenses for a competent mechanic to superintend putting up the work. We have no definite information as to freight, and purposely made the estimate high to cover contingencies. We presume the acceptance of either of the above propositions would result in a saving to you.

Third Question.—"Supposing the water wheels to stand 20 feet from the body of the water of the river, and the bottom sill to be one foot higher than the bottom of the dam, what should be the dimensions of the bulkhead and flume, anticipating the necessity of building an extra wheel to provide for the contingency of being reduced to five feet head and fall?"

Third Answer.—The bulkhead should be at least 20 feet wide at the dam, and widened so as to be 30 feet at the building, and extend to the building. The bulkhead would be a part of the foundations of the building. The above would be of sufficient size so you could add another wheel if required at some future time.

Fourth Question.—"What are the items of building walls, excavation, bulkheads, millwright work, masonry, &c., which you estimate at $3,000?"

Fourth Answer.—The estimate of three thousand dollars was for excavating for flume and wheel trunks, building flume and trunks to convey the water from bulkhead to the wheels, and building husk frame, head-gates and rack. Wheel gates will be furnished by us. We think, perhaps, the actual cost would be less than three thousand dollars, but in making estimates of this kind it is well to provide for contingencies that may arise.

Not knowing what the amount of your excavation will be, it is difficult for us to fix the definite sum on each item, but we have made the estimate which we think will fully cover the whole.

Fifth Question.—"What will it cost to put in an additional wheel of extra size, to provide for the contingency of low water?"

Fifth Answer.—You can add an extra trunk to set an extra wheel on when you erect the building, and afterwards add the wheel and connections, if needed. The extra wheel and connections would probably cost about two thousand five hundred dollars.

Sixth Question.—"What will be the dimensions of the openings in the different wheels and size of wheels?"

Sixth Answer.—The wheels will be six feet diameter and the openings from bulkhead to the wheels will be 3x5 feet; the issues of the wheels will be equal to an opening of 12x40 inches. This is the maximum, and would only be required for fire purposes; for ordinary domestic purposes 12x20 inches on a single wheel would be sufficient.

Seventh Question.—"How low may the wheels be set with advantage in reference to the ordinary height of backwater?"

Seventh Answer.—We ordinarily set the bottom of our wheels at the top of the usual head of water in the tail race. We recommend the excavating a tail race to reduce the back-water, as suggested in note to question seventh. We can adapt our wheels to any amount of backwater.

Eighth Question.—"What would be the expense of a steam engine placed in the building to be run to work the pump in the contingency of the dam giving out, or being repaired or rebuilt or of an extraordinary drought?"

Eighth Answer.—We could give you a boiler and rotary engine to run in contingencies for domestic supply, and also for fire purposes, for seven thousand to eight thousand dollars.

Ninth Question.—"If we erect steam works what will be the annual expense of keeping the works in operation over and above the expense of keeping water works in operation, or rather what will be the items of expenditure, e. g.: number of employees; quality of labor, skilled or unskilled; tons of coal required, oil, &c., &c.?"

Ninth Answer.—With either steam or water one man should be in attendance. For water one man would be sufficient, provided he sleep in the building. Steam would require two men to relieve each other. Persons competent to run the water works could probably be obtained at a less price than for steam. The consumption of coal would probably be about fifteen hundred pounds daily.

Tenth Question.—"For steam works what would be the number of cylinders, diameter and length of stroke? What number and size of boilers, with number and size of flues—estimating for coal? And the same items for a steam engine, &c., to use in emergency with the water works?"

Tenth Answer.—Steam works will require two piston engines, 14x24 inch cylinders, quarter crank, and one rotary engine of 150 horse power, and two boilers seven feet in diameter and seven feet long, with about six hundred flues each, mostly two inch diameter, but a portion of them three inch.

Eleventh Question.—"What is the thickness of the proposed water pipes, and number of lineal feet to the net ton?"

Eleventh Answer.—The water pipes should be half an inch thick, and will weigh five pounds per foot for each inch diameter; that is, four inch pipe weighs twenty pounds to the foot, and twelve inch pipe weighs sixty pounds to the foot.

LENGTH OF PIPE PER TON.

4 inch, 100 feet.	8 inch, 50 feet.
5 inch, 80 feet.	9 inch, 44 feet.
6 inch, 66 feet.	10 inch, 33 feet.
7 inch, 57 feet.	12 inch, 28 feet.

Our estimate of cost of wooden trunk, twelve inch diameter, to bring water from the St. Lawrence, is about one dollar per foot, beside the expense of laying. We strongly recommend the use of soft water, even if you have to filter it, as we believe your people would not be satisfied with hard water.

Yours respectfully,
B. HOLLY.

Your committee have also had placed in their hands a copy of the Toledo *Commercial* of March 28, 1868, which contains an elaborate report of a committee appointed by the common council of that city to report upon water supply for Toledo. They had visited Auburn and Lockport, which places are supplied with water, on the Holly plan, also the water works at Buffalo and Cleveland, which are supplied from reservoirs, and after careful investigation and estimates report in favor of adopting the Holly system.

There is a variety of opinion existing among our people upon the question of the proper source of deriving the supply of water, some being strongly in favor of the St. Lawrence, and others equally tenacious advocates for the Oswegatchie, while all agree that if a sufficient supply could be obtained from one or more artesian wells, all the objections which have been urged against either river are removed.

An artesian well recently put down at Chicago, struck at a depth of 1,250 feet, a rapid stream of water, and delivers at the surface 600,000 gallons per day and through a pipe and at an elevation of forty-five feet 400,000 gallons per day.

A well put down by the International Oil Company at North Augusta on the opposite side of the St. Lawrence, struck at a depth of 450 feet a heavy flow of water and for the past two years said well has been flowing many hundred thousand gallons per day. It is believed that an abundant supply of water can be obtained from artesian wells. The elevation of the earth in every direction from Ogdensburgh is such as to indicate almost certain success from sinking artesian wells. So well convinced are your committee that they recommend that the experiment be tried. The means authorized to be raised are ample to test the question. If the plan of a reservoir is decided upon they would recommend the sinking of an artesian well on Lime Kiln Hill. On the other hand, if the Holly system is adopted they would sink a well at the east end of the dam. Should the experiment prove successful, the water from the wells might be used for all domestic purposes, and the river water brought into requisition at times of fires.

Under the law providing for water works it will be the privilege of the incoming Aldermen to submit the question to the tax-payers at the earliest practicable day. The Common Council has, however, without further action of the tax-payers authority to test the practicability of artesian wells, and the committee recommend that they do so at the earliest practicable day.

N. H. LYTLE,
CHAS. I. BALDWIN,
G. W. PEARSONS,

OGDENSBURG, May 5, 1868.