

*Including Annual reports for
1853-54 + 1855*

ACT OF INCORPORATION,

BY-LAWS,

ORDINANCES, RULES AND REGULATIONS

OF THE

Board of Water Commissioners

OF THE

CITY OF DETROIT.



DETROIT:
DAILY INQUIRER POWER PRESS PRINT.
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The City Auditor respectfully asks the Common Council to take into consideration the propriety of memorializing the Legislature, as follows, to wit: *To the Honorable, the Senate and House of Representatives of the State of Michigan, in Legislature assembled:*

The memorial of the Common Council, of the city of Detroit, respectfully sheweth that, under existing laws, property of the United States, State, County and City, of religious, benevolent, and literary institutions and societies, amounting to the sum of \$233,570, as appears by the report of the City Assessors, made June 15, 1852, is entirely exempt from taxation; to this, your memorialists do not object; but there is also in said city, property of railroad, plank road, mining, banking, and other companies, amounting to about \$3,000,000, which would be valued by the Assessors at \$750,000, is exempted from taxation, for county or municipal purposes, while all the taxable property in said city as is shown by the same report, amounts to only \$3,008,510, consequently, the entire burthen of taxation for said purposes, is borne by about three-fourths of the property.

The property paying State tax only, requires and receive protection from our Police, Watch, Fire Department, and all other branches of the government of this Corporation, equally with the property paying general taxes, without paying any portion of the expenses thereof to the city or county; under equal laws for taxation, the State would be entitled to about one-eighth of the whole amount levied in the city, the county about one-fourth, and the city, including school and highway taxes, about five-eighths, consequently, seven-eighths of the taxes paid into the State Treasury, by the above named Corporations, equitably belong to the county and township where the property exists,* but being divested from its proper channel, the homestead of every citizen is made to pay an excessive tax.

Your memorialists believe it to be the part of wisdom, for all governments, to offer every proper inducement for the citizen to own the fee simple of his homestead, and your predecessors have, in their wisdom, made liberal provisions for exempting homesteads from levy and sale upon executions for debt, and while they do not ask that they should be exempt from their just and equitable proportion of taxes for the maintenance of Government; yet they are of opinion that such an exemption of property, used for the protection of families, but yielding no pecuniary benefits, would be far more rational and equitable, than to burthen it with an increased share of taxation, and exempt from tax for general purposes, property from which its owners derive large profits annually.

Your memorialists, therefore, would most respectfully, but earnestly remonstrate against the passage of any future law, authorizing the payment of specific State taxes, in lieu of all other taxes.

*Of the sum of \$32,000, of tax paid to the State, being upon property within the city, \$4,000 rightfully belongs to the State, \$8,000 to the County, and \$20,000 to the city. If these sums were applied where they rightfully belong, the tax paid in the city, would be reduced one fourth.

OFFICE OF WATER WORKS, }
Detroit, Dec. 20, 1852.

To the Hon. the Common Council of the City of Detroit.

In accordance with section 3 of "An ordinance entitled an ordinance to amend an ordinance entitled an ordinance to provide for the better management of the Water Works of the City of Detroit," dated February 24, 1852; the Board of Trustees of the Detroit Water Works created by said ordinance, beg leave to submit to your honorable body "in writing, a system for conducting and managing said works."

The system of management proposed is more fully

shown in the accompanying proposed "Amendment to the Charter of the City of Detroit," which your Board of Trustees most respectfully recommend to your honorable body, to be placed before the Legislature of this State at their coming session, for their action.

We would also respectfully call your attention to the accompanying report of the Commissioner of Water Works, which contains a full statement of the condition of the works, the receipts and disbursements, and an estimate of the cost of new works. All which is respectfully submitted.

SHUB' CONANT,
E. A. BRUSH,
H. LEDYARD,
J. A. VAN DYKE,
W. R. NOYES,

Board of Trustees.
OFFICE OF WATER WORKS, }
Detroit, Dec. 20, 1852.

To Shubael Conant, Henry Ledyard, E. A. Brush, James A. Van Dyke, and Wm. R. Noyes, Board of Trustees of the Detroit Water Works:

GENTLEMEN:—In conformity with your instructions, as contained in the resolution passed at your meeting of November 5th, 1852, I beg leave to submit the following report of the condition of the works, the receipts and disbursements, to December 1st, and an estimate of the cost of construction of new works.

Though yet entirely inadequate to the wants of our rapidly growing city, some considerable improvement has been made in the condition of the water works since the control and management of them was transferred to you. For several years past there has been much and just complaint of an insufficient supply of water in different parts of the city. This had resulted from various causes, the most prominent of which was that the distributing pipes, which are principally logs of small calibre, were laid regardless of any system or plan. As the limits of the city extended, persons were permitted to lay the logs to their premises, and extensions have in many instances, from time to time, been made on the same lines, until lines of logs of 2 inches bore were ascertained to be supplying water to from 50 to 80 families. Also, in many instances the connection between these extensions was found to have been made with a lead pipe of 5-8 of an inch interior diameter. In one instance, in the 8th ward, three blocks of buildings were found to be supplied through a pipe of that size. In another instance, in the 1st ward, the same number of blocks were supplied in the same manner; and the entire supply to that portion of the 5th ward north of Macomb avenue and west of the Grand Circus and Witherell st., was supplied through three pipes of that size. With this defective arrangement of distribution it could not be supposed that the people using from these lines would be able to obtain the supply of water necessary to their health and comfort. This defect, to some extent, has been remedied by laying new lines of iron pipes into those districts during the past season, which has resulted in furnishing for the present a good and constant supply. It can, however, be looked upon only as a temporary relief, as the rapid increase of the city demands a more extended system of water supply.

As a proof of the increased demand, I would state that from May 1st to December 1st, 1852, a period of seven months, 368 new hydrants have been erected. Of these 48 only are connected with the iron pipes, and 310 are connected with the logs.

At the time the works were brought under your charge there had been laid iron pipes as follows:

Of 10 inch main, through which the entire supply to the city is furnished.....	1 mile 1573 feet
Of 8 inch pipe.....	1450 feet
Of 6 inch pipe.....	8641 feet
Of 4 inch pipe.....	1 mile 8703 feet
Of 3 inch pipe.....	3467 feet

Making in all..... 4 miles 3274 feet
During the past season there have been pipes laid down as follows:

Of 6 inch pipe.....	4350 feet
Of 4 inch pipe.....	8600 feet
Of 3 inch pipe.....	666 feet

Total..... 1 mile 3325 feet
So that the entire length of pipes now laid amounts to 6 miles 1319 feet.

In addition to the iron pipes there are now in use from 30 to 40 miles of wooden logs, which, for the true interest of the works and the citizens, should be disconnected from the works and replaced with a proper system of iron mains and distributing pipes, as rapidly as means and economy may allow.

The objections to logs are that they can supply but a limited quantity of water; that they are continually decaying, rendering the water unwholesome, and getting out of order, so that leakages are produced, and a large part of the water pumped is wasted. This increases the expense of every part of operating; it increases the duty of the engines, the consumption of fuel, and the expenses of repairs. In the statement of expenses given below, you will observe that \$817.61 has been paid during the seven months ending December 1st, for the repairs of logs, cisterns, &c. This is but one branch of the expense, and it would be difficult to say what proportion of the expenses of repairs and fuel at the Engine House should be charged to the same account.

Another cause of insufficient supply is attributable to the small size of the reservoir, and the construction of the engines combined. In proof of this, I would call your attention to the following tabular statement of the duty of the engines during the past seven months.

The capacity of the reservoir when full is 353,430 gallons, and the engines are generally stopped when the water is within 18 inches of the top.

Tabular Statement of the Duty of the Engines from May 1st to December 1st, 1862.

Months.	No. gals. pumped.	Average number gal's per day	Times full of reserv'r per day	Cords of wood consumed.	Cost o wood
May	22,851,397	737,142	2 9-100	87 5-10	\$154 92
June	24,004,611	800,154	2 26-100	95 98-100	169 00
July	24,413,439	787,530	2 23-100	111 29-160	198 26
August	27,001,527	871,017	2 46-100	113 9-10	196 68
Sept	27,201,126	906,704	2 57-100	113 9-10	214 15
Oct	30,019,530	968,372	2 74-100	138 39-100	196 37
Nov	21,380,387	712,879	2 2-100	87 75-100	166 69
Total	176,872,016	826,505	2 34-100	746 71-100	1296 02

The above table shows the average daily use of water during a period of seven months to have been 2 1-3 times the utmost capacity of the reservoir. Now, to give a full and ample supply, the water should be kept constantly at the same elevation in the reservoir, and the engine should be so run as just to supply the amount drawn off. But the construction of the engines will not permit this.

The two engines now in use, the larger being 150 and the small one 45 horses power, are both non-condensing, and are run at a high pressure of steam, and either of them, while being run, elevates into the reservoir a larger quantity of water than is drawn off for supply to the town, so that the only way of operating is to allow several feet of the water in the reservoir to be drawn off—to start the engine, and run until the reservoir is refilled, and then stop again, to go over the same routine. Thus there are several "runs" made during each day, and the head in the reservoir, varying at each "stop" and "start," affects the supply to hydrants connected with the pipes in the more elevated parts of the city, making the supply irregular and intermittent.

This mode of operating, caused by the incapacity of the reservoir, together with the use of steam at high pressure is also very expensive. The fires have to be kept burning almost constantly, and at each "run" the steam has to be raised with an extra expense of fuel.

By reference to the tabular statement above, the average daily consumption of water is shown to have been 826,505 gallons, which has been raised to an elevation of 70 feet at a cost for fuel of \$6 05. This is believed to be a more expensive duty than that of any other pumping engine used for supplying water to towns. The engine at the Cincinnati works elevates 1,700,000 gallon 180 feet high for \$5 70, and to elevate the same number of gallons only 70 feet high with the Detroit engine would cost \$12 46. In Buffalo, a city twice the size of Detroit, the water is raised 88 feet high for \$5 per day. The number of gallons pumped daily in the latter city I have not been able to ascertain. Mr. Wicksteed's Cornish engine at the East London Water Works, does more than twice as much duty for the fuel consumed as the Cincinnati engine. From the examination I have been able to give to the subject, I am satisfied that we are operating the present works at a loss of more than \$1200 per year for fuel alone, and if continued upon the same plan, this proportion of loss will increase at the same rate with the increase of our inhabitants. The only remedy for this present and prospective evil, is the construction of a new reservoir and the adoption of the Cornish pumping engine, (low pressure,) in the place of the high pressure engines now in use.

In the estimate of the cost of new works which I give below, a new reservoir of the capacity of 10,000,000 gals. is included. The design is to build it of earth embankments, with two compartments, so that either compartment can be cleaned without shutting off the supply from town as at present.

There is also included an estimate for two Cornish engines. You may consider it unnecessary to procure both of these at present, but one of them should be contracted for at the earliest possible period. The small engine at present in use, after another season will be entirely inadequate to any effective duty, as the probable increase of inhabitants will cause a greater consumption of water than it is capable of pumping. And as no works can be considered complete without two engines, one always being kept in reserve in case of accidents, you will readily perceive the necessity of procuring a new engine. The 160 horses power high pressure engine can be retained to advantage for the reserve engine at present. But in a very few years, you will probably find it necessary to replace it with the second Cornish engine.

While the subject of engines is under consideration, I would direct your attention to the following remarks upon "condensing and high pressure engines," taken from a valuable work upon the steam engine, published by the "Artizan Club."

"Generally, all engines are made on the high pressure plan, where the carriage of condensing water would be inconvenient, or the first cost of the machine becomes a point of more importance than an increased consumption of fuel. High pressure engines are, *certis paribus*, necessarily more expensive in fuel than low pressure engines, as they occasion the loss of power derivable from a vacuum, and as the quantity of heat in the same weight of steam is nearly the same at all pressures, there is no countervailing source of economy to compensate for this deduction. The use of high pressure engines in circumstances in which the low pressure engine is applicable, is not to be commended; and the high pressure engine is rarely employed for other purposes than locomotion on railways, except in the case of very small engines required for some temporary or trivial purpose."

I would also call your attention to the following remarks upon Cornish pumping engines, taken from a report of J. H. McAlpine, Esq., Chief Engineer of the State of New York, made to the Water Commissioner of the City of Albany, in August, 1860:

"The Cornish pumping engines have been regarded by mechanics as the most perfect structures which have been designed by modern engineers. Indeed they have been copied and applied to other works, where the peculiar circumstances of their arrangement were quite inapplicable, although their economy and effect have been quite remarkable.

"Mr. Wicksteed, the Engineer of the East London Water Works, in 1843 took down a large and expensive Boulton and Watt engine, and substituted one of the Cornish engines, for that company's works, which was operated with one-half of the previous expense.

"The duty performed by each of the pumping engines at the mines in Cornwall, has been kept since 1822, and led to the most careful examination of every means of reducing the expense of working them.

"Other plans of pumping engines have been designed, some of which rival the Cornish engines. Among these, however, the gigantic engines erected in 1843, to drain the Harlaem Mer, in Holland, are the most celebrated.

"Many of the cities in the United States are supplied by water elevated by pumping engines; but these do not compare favorably with similar works erected in Great Britain and on the Continent.

"The Cornish engine may be generally described as a vertical, condensing, beam engine, with a large cylinder intended to use the expansive force of the steam to its most useful extent, with pumps driven by a direct connection from the engine beam.

"The great depth of the mines require plunger rods of great length and weight, and this circumstance is made available by using the power of the engine mainly to elevate the rods, which in their descent force up a corresponding weight of water.

"When they are too heavy or too light to elevate the quantity of water required, they are adjusted with weights, added to the beam.

"From the examination which has been given to the subject, a steam engine constructed nearly after the approved form of the Cornish engine, and a plunger pump attached to each end of the arm of the engine beam, would be recommended."

I may add that another proof of the perfect adaptability of the Cornish engine to the purposes of water works is the complete control which the engineer can always have over the machine. The running of the engine can be so regulated as to make one or fifteen strokes per minute, and thus in cases of necessity, could be so gauged as to pump into the reservoir the exact amount of water being drawn off, and by that means retain a constant head.

The incapacity of the present works is also frequently felt in cases of fires. In the upper parts of the city the feed pipes to the fire cisterns are so small that one engine can be supplied only for a short time. At a late fire on Woodward avenue, between State and Grand River streets, where two small frame buildings were burned, all the cisterns in the vicinity were entirely emptied, and as a last resort the firemen were compelled to form a line of engines from the reservoir on the corner of Campus Martius and Monroe avenue. The fire occurred at about two o'clock in the morning, and the feed pipes were left running, but the cisterns were not all refilled until the next evening! To about one-half of the settled portion of the city there is no adequate protection afforded from fire. To the well regulated Fire Department which we have, this state of things would seem to be but little encouragement.

In the economical management of the works, there is also one other matter which demands attention and improvement. Most of the hydrants now in use are defective in construction and material, and cause a large and unnecessary waste of water. In order to render the first cost as cheap as possible, it is the practice to use the lightest lead pipe in their construction. In addition to this, in order to save expense, the cocks or faucets are made without any regard to strength or finish. These cocks are placed in the ground, and the water is drawn by turning a rod connected with them. The cocks soon become impaired by use, in consequence of the sediment contained in the water, and many leakages thus occur, the water from which passes off unobserved through drains, while in other cases, cellars are inundated and the foundations of buildings undermined and weakened. The general adoption of the patent safety valve hydrant invented by Mr. Baribolomew, and adopted and strongly recommended by the Croton Board in New York, is very desirable, not only for the protection and safety of the works, but for the health and ultimate economy of those using water.

The first cost of these is more than of those now in use, but they will so seldom need repairs that the difference should not be thought of. Should they be generally introduced here, they can be furnished for \$6 each, being \$2 more than the cost of the hydrants at present use. This hydrant is self acting, in part, shutting off the water when not in use, and permits of no escape of water, except above ground, at the common outlet. Another favorable consideration which this hydrant has is the easy access which is afforded for making repairs when out of order, making it unnecessary to remove the stock or dig up the pavement or grounds, as is customary with the ordinary hydrant.

Statement of Receipts for 7 months, from May 1st to December 1st, 1852.

On hand May 1st.....	\$2,134.05
Received from water rates.....	13,405.58
Miscellaneous receipts.....	280.71
Rec'd for service cocks and inserting same.....	93.00

Total..... \$15,893.34

Statement of Expenditures from May 1st to December 1st, 1852—Expended on account of construction

For distributing pipes and laying same.....	\$7,453.08
For engineering.....	168.28

7,621.36

Expended on account of expense and repairs.

For salaries and repairs at Engine House.....	\$1,389.13
For wood purchased.....	2,363.68
For repairs of reservoir building....	34.75
Expenses of management, including salaries of Commissioner, Sup't, and Clerk, Printing, Office Furniture, Stationary, and the expenses of assessing.....	1,622.03
For repairs of logs, cisterns, fire hydrants, &c.....	517.61
For repairs of the dock.....	894.35
Paid old liabilities (water certificates).....	430.91

Total..... \$7,543.46
\$16,163.82

Leaving December 1st a balance of.. \$729.52

<i>Estimate of cost of new works.</i>	
An earth embankment reservoir of the capacity of 10,000,000 of gallons.....	\$50,000 00
Two Cornish pumping engines.....	70,000 00
20 inch rising main from engine house to reservoir, 1 mile 1.380 feet.....	42,565 50
1 mile 4,670 feet of 16 inch pipe.....	51,381 23
2,200 do of 12 do.....	6,807 74
1 mile 3,370 do of 10 do.....	21,202 40
3,750 do of 8 do.....	6,590 83
2 miles 3,000 do of 6 do.....	21,129 09
22 miles 2,240 do of 4 do.....	115,492 55
1 3,750 do of 3 do.....	3,057 42
150 fire hydrants @ \$35.....	5,250 00
200 four inch stop valves @ \$30.....	6,000 00
20 six do do @ \$40.....	800 00
8 eight do do @ \$55.....	330 00
12 ten do do @ \$70.....	840 00
8 twelve do do @ \$90.....	720 00
13 sixteen do do @ \$150.....	1,950 00
3 twenty do do @ \$200.....	600 00
Two hydraulic presses and fixtures.....	1,000 00
Expenses of proving pipes, including rent of yard, &c.....	5,000 00
3,500 tons carted @ 50 cts.....	1,750 00

\$412,686 76

For contingencies and superintendence add 10 per cent..... 41,268 67

\$453,955 43
Less the value of pipes on hand..... 2,614 43

\$451,441 00

The above estimate is for the ultimate cost of the works when all the necessary mains and distributing pipes shall have been laid over that portion of the city which is included between the river and Winder street, a distance of about one mile. The total expenditure of this amount will probably not be required for six or seven years, but \$250,000 can be expended to advantage within the next two years.

No estimate for lands or lots is included as the present docks and the new reservoir grounds purchased for the purpose are considered sufficient. All which is respectfully submitted. JACOB HOUGHTON, Jr.,
Commissioner and Civil Engineer.

A BILL to amend the laws relative to "Supplying the City of Detroit with Pure and Wholesome Water," and to provide for the completion and management of the Detroit Water Works.

Sec. 1. The people of the State of Michigan enact, That Shubael Conant, Henry Ledyard, Edmund A. Brush, William R. Noyes, and James A. Van Dyke, be, and they are hereby named and constituted as a "Board of Water Commissioners for the City of Detroit;" who, and their successors in office, shall be a body politic and corporate, by the name and style of the "Board of Water Commissioners of the City of Detroit," and by that name shall have perpetual succession, with power to contract, sue and be sued, to purchase, hold and convey personal and real estate, to have a common seal, to alter and break the same at pleasure, to make by-laws and ordinances, and do all legal acts which may be necessary and proper to carry out the effect, intent and object of this act.

Sec. 2. The said Commissioners shall hold their offices respectively for the term of three, four, five, six and seven years, from the first Tuesday in May of the year one thousand eight hundred and fifty-three; said Commissioners shall within sixty days after the passage of this Act, decide by lot their respective terms, which decision shall be notified by a written statement to the Common Council of said city, which shall be entered of record on the books of the said Common Council; and at their first regular meeting in the month of April, in the year one thousand eight hundred and fifty-six, and annually thereafter, the said Common Council shall elect and appoint a citizen of said city, being a qualified voter and a freeholder, as a Commissioner, who shall hold his office for seven years from the