

CHARTER  
OF THE  
Lake Hydraulic Company,  
TOGETHER WITH THE  
CONTRACT FOR SUPPLYING THE CITY OF MILWAUKEE  
WITH  
PURE WATER;  
AND THE  
FIRST ANNUAL REPORT  
OF THE  
BOARD OF DIRECTORS,  
MILWAUKEE, DECEMBER, 1852.

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MILWAUKEE:  
PRINTED AT THE DAILY SENTINEL OFFICE,

1852.

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# AN ACT

## To incorporate the Lake Hydraulic Company :

The People of the State of Wisconsin, represented in Senate and Assembly, do enact as follows :

SECTION 1. John Lockwood, James Kneeland, D. P. Hull, J. M. Glid-  
don and Alexander Mitchell, be, and they are hereby appointed commis-  
sioners under the direction of a majority of whom subscriptions may be  
received to the capital stock of the Lake Hydraulic Company, hereby in-  
corporated, and they may cause books to be opened at such time and place  
as a majority shall direct, for the purpose of receiving subscriptions to the  
capital stock of said company, first giving ten days notice of the time  
and place of taking such subscriptions, by publishing the same in two dai-  
ly papers printed in the city of Milwaukee.

SEC. 2. The capital stock of said company shall be two hundred and  
fifty thousand dollars, in shares of fifty dollars each, and as soon as one  
thousand shares or more of stock shall be subscribed, and five per cent-  
um paid thereon, the subscribers of such stock, with such other persons  
as shall associate with them for that purpose, their successors and assigns,  
shall be and they are hereby declared and created a body corporate and  
politic by the name and style of "Lake Hydraulic Company," with perpet-  
ual succession, and by that name shall have all the privileges, franchises,  
and immunities incident to a corporation; they shall be capable in law of  
contracting and being contracted with, suing and being sued, defending  
and being defended in all courts and places; they shall be capable in law  
of purchasing, holding, selling, leasing and conveying estate, personal,  
real or mixed, so far as the same may be necessary and proper for the con-  
struction, extension, management and usefulness of the works of said com-  
pany; and for the good government of the same; they may have a com-  
mon seal which they may alter and renew at pleasure, and generally may  
do all and singular the matters and things which to them it shall lawfully  
appertain to do for the well being of the said corporation.

SEC. 3. The affairs of said company shall be managed by a board of  
five directors, who shall be chosen by ballot, each share of stock being en-

titled to one vote, the votes to be delivered in person or by proxy duly authorized; which directors shall appoint one of their number president; and for the purpose of electing the first directors, the said commissioners or a majority of them after the stock shall have been subscribed as provided in the second section of this act, shall give ten days notice, in the newspapers, herein before mentioned, of the time and place by them appointed, for the subscribers or stockholders to meet for the purpose of electing directors, and annually thereafter on the second Monday of January the stockholders shall meet for electing directors as aforesaid: *Provided*, that none but stockholders shall be elected directors, and that previous to the first election, the commissioners hereinbefore named shall elect one of their number president, and they may perform all the duties and be invested with all the powers of directors.

SEC. 4. A majority of said board of directors shall constitute a quorum for the transaction of business. They shall have power to make and establish such By-Laws, Rules, Orders and Regulations as may be necessary for the management of the affairs of said company, to make such covenants, contracts and agreements with any person or persons, copartnership or body politic whatsoever, as the execution and management of the works or the convenience and interests of the company may require.

SEC. 5. The said company shall have power and the exclusive right and privilege of building water works in the city of Milwaukee, for supplying water to said city and its inhabitants, to be taken from Lake Michigan, and for making all excavations, and completing such other work as may be necessary to convey water in pipes through all the streets, alleys, highways and commons now in said city, or that may be added thereto, also for crossing under any river or stream of water now or hereafter to be brought within the limits of said city, as provided for in a contract entered into between the city of Milwaukee and John Lockwood on the fourth day of February, A. D. 1852, a certified copy of which contract shall be placed on file in the office of the Secretary of State.

SEC. 6. If said company shall not within one year from the date of said contract, commence the construction of said works and fully complete the same within two years from the commencement of the same so far as to put them in successful operation, then the rights and privileges and powers of said corporation under this act, shall cease and be null and void.

SEC. 7. If from any cause an election for directors shall not be held at the time specified therefor, the same may be held at any other time upon ten days notice being published in the papers herein before named, and until such election the directors of the preceding year shall continue to act, and this charter shall not be voided by reason of any irregularity or want of such election, and in case of vacancy from the death or resignation of any director, his place may be filled by the board of directors.

SEC. 8. The stockholders holding a majority in value of the stock may at any annual or special meeting, increase the capital stock of said company to any amount not exceeding three hundred and fifty thousand dollars.

SEC. 9. The property of every individual invested in said corporation shall be liable to be taken in execution for the payment of his or her debts, in such a manner as is or may be provided by law: *Provided*, all debts due the company shall be first paid.

SEC. 10. The said company are hereby authorized in their corporate capacity to borrow any sum or sums of money from any person or persons, corporation or body politic of any kind, and make and execute in their corporate name all necessary writings, notes, bonds, or other papers, and make, execute and deliver such securities in amount and kind as may be deemed expedient by said corporation, for all purposes necessary in carrying out the objects of said company; and the official acts of said company are declared binding in law and equity upon said corporation and upon all other parties to such contracts.

SEC. 11. If any person shall wilfully and knowingly break, injure, or destroy, or cause to be done any act whatever, and thereby injure and destroy any building, machinery, pipes, or structures of any kind, or anything appertaining to the works of said corporation or whereby the same may be stopped, obstructed or injured, the person or persons so offending shall be deemed guilty of a misdemeanor and being thereof convicted shall be punished by a fine and imprisonment, or either, at the discretion of the court; and provided such criminal prosecution shall not in any wise impair the right of action of said company for damages by a civil suit hereby authorized to be brought for any such damage or injury as aforesaid, by and in the name of said corporation in any court having competent jurisdiction.

SEC. 12. This act shall be in force from and after its passage, and in case of a violation by the company of any of its provisions, or of the contract herein referred to, the Legislature of the State may resume all and singular the rights and privileges hereby granted.

SEC. 13. This act shall be favorably construed to effect the purpose thereby intended and the same is hereby declared to be a public act and copies thereof printed by authority of the State shall be received as evidence thereof.

*Approved, April 5th, 1852.*

## COPY OF CONTRACT:

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*The City of Milwaukee with John Lockwood and others.*

Articles of agreement made and entered into this fourth day of February, A. D. 1852, between the City of Milwaukee of the first part, and JOHN Lockwood and such other persons as may hereafter be associated with him, of the second part, witnesseth, That the said party of the first part doth agree to grant and convey, and by these presents doth grant and convey to the said parties of the second part, their legal representatives and assigns. the exclusive right and privilege of building water works for supplying water to the said city of Milwaukee, to be taken from Lake Michigan, and making all excavations and completing such other works as may be necessary to convey water through all the streets, alleys, highways and commons now in said city or that may be added thereto during the time of this agreement; also for crossing under any river or stream of water now or hereafter to be brought within the limits of said city, during the full term of fifteen years from the completion of such works.

And the said party of the first part does further agree with the said parties of the second part, that all the personal property necessarily connected with said water works or belonging thereto, shall be exempted from taxes for city purposes, for the space of five years from the date of their completion.

And the said party of the first part does further agree with the said parties of the second part, or their legal representatives, that they will purchase said water works with all their appurtenances thereunto belonging at their appraised value in cash, having first given six months notice thereof, at the expiration of said term of fifteen years, or within six months thereafter, said valuation to be made by five disinterested citizens of the United States, two of whom shall be appointed by each of the parties hereto, who shall together agree, upon a fifth, and when said board of appraisers shall have been organized, they shall proceed to assess the cash value of said property &c. as aforesaid. And if said purchase shall not be made during said six months, by the said party of the first part, then and in that case the rights and privileges under this agreement shall be extended to the said parties of the second part for the term of ten years longer, at the expiration of which said longer term, or within six months

thereafter, having as aforesaid given six months previous notice, the said parties of the first part shall again have the right to purchase said works, in manner and form as aforesaid, and if not so purchased, then this contract to be again extended and renewed for another term of ten years, and so on for terms not exceeding ten years each, until said party of the first part shall purchase said property as aforesaid.

In consideration of which agreements to be performed by the said party of the first part, the said parties of the second part hereby agree with the said party of the first part, that they will erect at their own expense, and on their own grounds, ample and suitable water works for supplying Lake water for public and private uses to the city of Milwaukee. Said works to be commenced within one year from the date of this agreement, and to be fully completed and in operation within two years from the commencement of the same.

And said parties of the second part further agree, that they will supply public cisterns necessary for the use of the Fire Department, which may from time to time be placed upon any of the streets, highways &c., where water pipes shall have been previously laid, free of expense to said city or fire department, it being expressly understood that said party of the first part shall construct said cisterns at their own expense and keep them at all times in good repair. And will also in like manner, supply all other public cisterns for the fire department wherever situated, provided the said party of the first part shall defray the expenses of laying pipes and connecting the same, with the water pipes laid by the said parties of the second part.

And the said parties of the second part further agree, that they will at all times keep a full supply of good pure lake water for the use of the citizens, public buildings, schools, colleges, institutions, asylums, hospitals, hotels, bathing houses, stables &c. &c., that may be on the streets, commons or highways where said water pipes shall have been previously laid down, at fair and reasonable prices, and not to exceed the customary prices charged by water works of a similar capacity and consumption in the United States.

And the said parties of the second part do further agree, that all excavations &c., shall be made with the least possible inconvenience to the public, and all injury to public or private property, resulting from such excavations, shall be repaired by said parties of the second part with due diligence, and left in as good condition as before such excavations were made.

And it is further expressly understood by the parties hereto, that the business of making connections with all water pipes and excavating for the same belonging to said works, shall belong exclusively to the parties of the second part, and at no time during said term, shall such connections or excavations be made by said party of the first part, or by any person or

persons by their authority. And also, that all pipes and stocks or hydrants and all other necessary fixtures for conveying and using said water, shall be purchased and sold exclusively by said parties of the second part, or their assigns, at fair and reasonable prices as aforesaid.

And it is further mutually understood by both parties to this agreement, that the said party of the first part shall furnish at their own cost and expense, all fire plugs they may want from time to time (if any,) including the attachments to the main pipes, and shall pay the party of the second part, per year, for supplying the same with water for use in extinguishing fires, only one half the usual price paid by other cities.

And the said parties of the second part further agree to supply the party of the first part with water for all municipal buildings (that may be required) free of expense.

And it is further expressly understood and agreed, that if the said parties of the second part shall neglect or refuse, at any time to keep and furnish the water herein agreed to be furnished, or to comply with any of the covenants herein contained, on their part, then and in that case, the said party of the first part may declare this contract and all the exclusive privileges hereby conferred upon the said parties of the second part, forfeited; except such neglect or refusal shall arise from causes beyond the control of the said parties of the second part.

Witness, the hands and seals of the said parties of the second part, and the hands of the Mayor and Clerk of said City of Milwaukee and the Corporate Seal of said city, the day and year first above written.

JOHN LOCKWOOD, [L. S.]

By JAMES KNEELAND, his Att'y.

[L. S.]

GEORGE H. WALKER,

*Mayor of the City of Milwaukee.*

Attest—ALFRED JOHNSON, *City Clerk.*

## REPORT OF DIRECTORS.

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As a necessary preliminary to the successful accomplishment of the important enterprize in which they have embarked, the Directors of the Lake Hydraulic Company, in this, their first Annual Report, desire to submit to the People of Milwaukee some of the leading considerations which induced them to undertake the work and of the permanent advantages which, in common with their fellow-citizens, they hope to derive from it. In all ages of the world, water, as one of the indispensable elements of animal and vegetable life, has been an object of man's early and earnest attention. A plentiful supply of pure water, as the chief source of comfort, and essential alike to the healthy condition of communities and individuals, has been ever regarded as an object of the first importance, and one in the attainment of which no labor or expense was too great. Entertaining a like high appreciation of its value, and aware of its manifold applications to the various useful and industrial purposes and pursuits of life, a few citizens of Milwaukee have taken the preparatory steps to start this project, not doubting that as its benefits and advantages are recounted, they will find abundant help among those who are equally interested with themselves in the accomplishment of the object.

Before adopting any fixed plan of operations, the opinions and advice of the most skilful and experienced Engineers in the country were sought and obtained, as to the best mode of supplying our city with water from Lake Michigan. Following this, surveys and estimates, upon the plan thus suggested, were carefully made, with results highly satisfactory, as to the cheapness of construction, and the easy accomplishment of the project in view. The ground work of the enterprize thus laid down, an act of incorporation was procured from the State Legislature, and the Lake Hydraulic Company regularly organized by the choice of Directors and Officers. A contract was next made with Messrs. Gliddon & Lockwood to construct the Water Works, in accordance with the plans adopted and the specific instructions of the Board of Directors; and it is confidently believed that the works, if constructed on the plan and upon the terms proposed, will compare favorably in point of material, workmanship, cost, and capacity, with any similar enterprize in the United States. and will be adequate to furnish an ample and unfailing supply of excellent Water to a population of 125,000 souls. The water is to be obtained from a pure and healthful source, several hundred feet from the Lake Shore; thence conveyed, through a spacious Aqueduct pipe, to two Pumping Engines of 120 horse-power each; elevated by them to a Reservoir 125 feet above the level of the Lake, and capable of holding Fifteen Millions of Gallons. Connected with the Reservoir, will be a descending Main, of 16 inches in diameter, which is to be the Main Artery for furnishing the Water to ten miles of Distributing pipe



leading through all the principal streets of the City. This brief general description will suffice to give a good idea of the proposed Water Works. They are to cost, by the contract, \$325,000, and are to conform to the plans and specifications of Theodore R. Scowden, Esq., the accomplished and experienced Engineer of the Cincinnati, Cleveland and other Water Works.

The Act incorporating the Lake Hydraulic Company made the capital stock \$250,000 with power to increase to \$350,000, to be issued in shares of 50 Dollars each. The Company, in its corporate capacity, is fully authorized by law to execute such Bonds and securities as may be deemed expedient in carrying out the original objects, and they have such other general powers conferred as were considered necessary for the safe, economical and efficient management of the water-works. Thus the Company offers to the public a brief history of its origin and its operations up to the present period, in a project which must be regarded as purely a home enterprise, of *vital* importance to the domestic and local interests of the City, and one that merits the special consideration of the citizens and Common Council, claiming their hearty encouragement and co-operation in furthering the objects of the Company, by a liberal subscription of stock to aid in the prosecution of the work.

The very great advantages which the inhabitants of Milwaukee cannot fail to derive from the construction of the proposed Water-Works must be obvious to all. The early history of every flourishing town in the Union provided with such works, dates the birth of that town's prosperity from the period of the introduction of water. On the other hand, incontestible evidence can be drawn from the records of ancient, as well as modern history, to show that the retrogression of cities, artificially supplied with water, commenced when the supply failed. Ancient Rome is a signal instance in point. That great city, which numbered at one period over a million of inhabitants and which could boast of its *nine* aqueducts, discharging daily into the streets, fountains and reservoirs, *one hundred and ninety-six millions* of gallons, received its most fatal blow in the destruction of her aqueducts. History records that this act of her Gothic enemies, cutting off the luxuries of the baths, and the supplies of the fountains in all their daily and hourly uses for domestic, as well as public purposes, so changed the whole internal economy and arrangements of the City, as to deserve to be ranked among the causes which most contributed to the decline and fall of Rome. The illustration goes to prove that no acquisition can be a greater blessing to a city than a bountiful supply of pure water, and no greater calamity can befall it than to be deprived of that supply.

The career of Milwaukee has been brief, eventful, and thus far prosperous. But a very few years have elapsed since the site now occupied by this beautiful and thriving city, was untrodden by the foot of the white man, and tenanted only by the Indian. The change seems to have been the work of magic. Yet even a greater change and more substantial improvement must follow the construction of the proposed Water-works, from the impulse which will thus be given to business, the Arts and Manufactures, and the salutary and wide-felt influence which it must exert upon the health, comfort, cleanliness, and general condition of the City.

The site of Milwaukee is one of great natural beauty. Two rivers, dividing a fine, elevated plateau, mingle their waters and flow together into the Lake, giv-

ing free egress and entrance to steamers and sail-vessels of the largest class. The city, which is most advantageously located, and admirably planned, rises from the River flat to the plateau beyond, commanding a fine view of the Harbor and Lake. The handsome material of which the better class of public and private buildings are constructed, the architectural taste and skill to which they bear witness, the pleasing tone of the prevailing color, and the general contour of the whole city, as it towers above the surf-beaten shore and stands relieved against a bright Western sky, with the blue expanse of Michigan smiling at its feet, presents to the eye of an observer on the lake a panorama of unrivalled beauty and effect. The climate, too, is genial and salubrious; the soil, as well in the immediate vicinity of the City as to the farthest verge of the State, remarkably fertile; the location of the city, on the eastern borders of the State, an excellent one for business—a combination of advantages which must render Milwaukee, within a very short period, both populous and wealthy; which makes it now an attractive point for the capitalist, the merchant and the manufacturer. Enjoying thus every natural advantage, Milwaukee lacks nothing but continued energy and enterprise to ensure the speedy and full development of all her latent and almost unlimited resources, as well as her steady growth and substantial prosperity. Nor could any one enterprise conduce more speedily or efficiently to this end than the early introduction of an abundant supply of pure water.

A leading feature in every plan for supplying a city with water is that which contemplates the *thorough cleansing* of the streets, as a sanitary measure. This is effected by means of hose and jets, attached to the hydrants. All refuse matter which, in the traffic and travel of an active business population, collects upon the surface of the streets, is thus speedily and completely removed. This matter, if suffered to remain, is rapidly converted into masses of putrifying filth, poisoning the atmosphere and engendering disease. The experience of all populous towns demonstrates the impracticability of protecting the inhabitants from miasmatic influences or periodic disease, when such causes of contamination are allowed to exist. The streets of Milwaukee have mostly a *gravel* surface; the worst of all for resisting a heavy traffic, and collecting and retaining, in the loose material, all manner of liquid and fetid matter. The only sure preventive is the regular and copious application of water from the hydrants. The Health Reports of different cities, in our own as well as foreign countries, prior and subsequent to the introduction of water, show not only that disease, mortality and the incidental expenses, were diminished from 10 to 20 per cent, by the abundant supply and daily use of pure water, but that the total number and cost of all Hospital cases, with the amount contributed by private individuals to charitable purposes, and the tax necessarily incurred in the support of Charitable Institutions, were materially reduced by the same cause.

The striking contrast in the general appearance, cleanly habits and ordinary health of persons in cities, where the supply of pure water is abundant, and of those who are debarred from this blessing, is a subject of frequent and familiar remark. The fact is well known to the Medical Profession that localities, especially in suburban districts, which are unprovided with water, are the hot-beds of disease and pestilence. From these emanate those fatal epidemics which sometimes so severely scourge a crowded city. Inasmuch, then, as the primary cause is to be found in the unhealthy condition of the atmosphere, resulting in part from the

want of pure water, and as the consequences are frequently so fatal to life and so oppressive to property, it is but reasonable to suppose that the inhabitants of a city would gladly aid in an object so sure to remedy the evil in question. Tax, in any shape, is a burthen; but disease is more oppressive than tax, for the latter draws upon the physical constitution of man, as well as upon his pecuniary means. Every citizen, then, has a direct personal and pecuniary interest in the construction of the Water Works, and a double incentive to aid the important enterprise.

The value which is placed, by general consent, upon the abundant supply of pure water in all towns and cities, is so great, that until Milwaukee possesses this treasure, it cannot hope for such accessions to its population, by immigration from the Old World and from other States of the Union, as it might otherwise reasonably expect. Dependent as it is, in a great measure, upon such an influx of population, it could inflict no more fatal blow upon its own interests than to withhold its aid and encouragement from the proposed work. None can fail to see how great an attraction an abundance of pure water in a city is to enterprising business men, seeking new homes and enlarged fields of enterprise in the expanding West.

Water Works, again, constitute an active agent in developing productive labor and affecting beneficially the pecuniary and animal economy of large towns.—Thus, the population of a city is made up of two principal elements, consisting of the higher and lower classes of society, representing the capital and labor which together constitute the wealth of that city. Whatever physical causes induce disease and weaken the energies of labor, tax capital as much as they affect labor; since the yield is increased or diminished, in proportion as the body is more or less vigorous; and when the health of the working-classes suffers from the want of pure water, or fresh air, it is not only time and money lost to them, but, in the diminution of productive labor, it is a loss to the community also. Again, time has a standard value in relation to money; whatever consumes time, consumes money; disease therefore, which impairs the working-man's efficiency and diminishes his productive power, operates to that extent as a loss to the public and a tax upon capital. Whatever, therefore, tends to improve or preserve the health of the laboring classes, is not only a direct benefit to them, but an advantage to the whole community. In this point of view, Water Works exercise an active influence in the development of productive labor, and improve health, prolong life, diminish taxes and increase wealth. Numerous instances might be cited where their influence in all these particulars, upon cities and towns, which had previously suffered greatly from the deficiency of pure water, was as marked as it was salutary.

In domestic life it is impossible to perfect the arrangements for home comfort where water supply is to be obtained without the hydrant and jet to assist in the operations of housewives. The crystal purity and soft qualities of Lake Michigan water peculiarly adapt it to domestic and culinary purposes. It is entirely free from foreign impurities, or hardness, and facilitates washing or cleaning, by readily yielding to the action of soap. And for the bath, or the toilet no cosmetic produced by art could equal its virtues and efficacy. No person undertaking the construction of a commodious dwelling, with a view to the slightest degree of comfort, would consider its internal arrangements at all complete without the convenience of a bath and water closet. These are esteemed the essential requisites of domestic

comfort; and there is no habit so beneficial in its results or which imparts such an agreeable and soothing sensation, and so animates and invigorates the body and mind as the frequent use of the bath. It is a household appendage of inestimable value, which no family residence should be unprovided with. For all infirmaries and hospitals the hydrant, bath, and water closet are absolutely indispensable for ablution and purification, to expedite the recovery of patients under medical treatment.— This hints again at tax, and the means of administering to the necessities of the afflicted and restoring productive labor to its wonted action, by the introduction of pure water. And since water in abundance is so highly appreciated for its curative and manifold virtues, as applied to the various purposes of life, it is astonishing that its paramount importance is often overlooked by men of means and enterprise, who seem eager to engage in other public improvements before home interests and comfort are first permanently secured.

Connected with the subject of Water-works, drainage and sewerage have occupied the time and attention of many enterprising and enquiring citizens, as well as legislative bodies in most large cities. Immense sums of money have been expended on works of surface and underground drainage, as a sanitary measure, and to effect pecuniary economy, by lessening the expense of manual or scavenger labor, by substituting for surface washing that by hose and jet, as already described. Taking the quantity of water required at a cost to make it an object to a company to furnish a supply, the change has been attended with great economy in cities, as compared with manual labor required in cleaning streets. In many instances at least *one-third* less the cost was found to result from water application, compared with the usual mode of procedure.

The subject of enquiry with reference to general comfort and economy may properly be extended to the effects of traffic in dry seasons of the year on business, or crowded thoroughfares of towns, where the amount of pulverised grit and dirt that the air is charged with, penetrating and damaging mercantile and household goods, is scarcely conceivable. Road dust forms a detritus, or mixture of mineral, animal, and vegetable matter floating in the atmosphere, forming a filthy compound which is inhaled and lodged upon the lungs, frequently causing injurious expectoration, and sometimes deep seated disease. Then again the befouling of linen and wearing apparel from the annoying effects of dust and want of water, subjects the population of a town to double the expense for cleanliness and neatness of personal appearance that otherwise would be incurred under a thorough system of water supply. Besides the annual saving of soap and domestic labor would be enormous, and an important consideration of economy.

The Fire Department of every city has claimed more attention, perhaps, than any other branch of public service, and is a subject which the Company have investigated with greater interest than any yet considered with reference to water works; as well to ascertain the extent to which water works have been valued as an acquisition to the Fire Department, as to show how far they may be relied upon as a means of extinguishing fires, and as a saving of life and perishable property with dispatch and economy. The common origin of fires may be traced to chimneys and stove pipes, for want of sweeping, and sometimes to wilful negligence and inattention on the part of domestics, even under the utmost vigilance and precaution of housekeepers to prevent its occurrence. It is exceedingly diffi-

cult by any means to guard effectually against the frequency and extent of fires, as intoxication, incendiarism, and spontaneous combustion, are to be included among the prolific causes. However, with an adequate supply of water at hand, when ignition takes place, the speedy application of the jet, from a family or private hydrant, would immediately extinguish fire, or hold it in check, until the alarm could be given and the fire engines brought to the spot to suppress it at once. Under the plan in view, for watering the city of Milwaukee, all the arrangements for connecting hose to Fire Plugs will be made by the Company, so as to provide facilities for applying water to fire without the aid of fire engines. A mutual protection can be entered into among property holders on different blocks by procuring for the tenantry a few sections of hose at a very small cost, to be brought into requisition at a moment's notice to extinguish fires. Considering then the present situation of Milwaukee, without water supply, its condition is one of imminent peril, as the sole reliance for the protection of life and property from the ravages of fire necessarily rests upon the Fire Department alone. And the very great uncertainty of finding a sufficient supply of water, when and where required, in the emergency of fire, is a circumstance not generally understood that doubles the risk of underwriters and necessarily augments insurance tax to an amount commensurate with that risk. Thus creating a burthen upon the property holders which would be essentially obviated by water works.

The means of extinguishing fire at New York after the introduction of Croton water reduced the insurance to 25 per cent less than before, and the number of fires and consequent losses was but *half* that which previously occurred. From this good result not only the property holders, but the insurance Companies also were immensely benefited, notwithstanding insurance rates were greatly diminished in consequence of it; because the interests at stake and the losses of both are comparatively mutual.

It will be found that a great saving will be effected in the Fire Department from the disbanding of Fire Companies, which is a consequence resulting from the introduction of water, and that many of the Fire Engines and other apparatus will be thrown into disuse by substituting hose and jet. Numerous instances of applying the hose and jet in direct connection with the water pipes, have completely demonstrated the practicability and efficacy of that mode of extinguishing fires, as it is found, for speedy application and immediate effect, to be the most effectual and simplest of fire annihilators yet employed. One man, at a moment's notice, can bring the water to bear with as much execution towards the extinguishing of fires, as would require a half hour or more warning, and 15 or 20 men to do with a Fire Engine, the hose and jet having all the advantage of start, which might be the means, perhaps, of saving many valuable lives, and a large amount of property from destruction. When a just comparison is drawn between one man's labor and the cost of this simple apparatus in the one case, and the complement of men, required to man a Fire Engine and the cost of the complex apparatus, with the expense of keeping the same in repair, in the other case, very just opinions may be formed with regard to the great economy and reformation to be effected in the Fire Department by the introduction of water. Yet the disorganization of the Department is not contemplated by any means, but merely the addition of a potent auxiliary, to facilitate its operations and supersede the use of unwieldy apparatus as far as possible.

There is another matter of importance to property owners worthy of mention as connected with water-works, which is that the property fronting on all streets where the lines of water pipes are laid is *immediately enhanced in value*, from the circumstance that the risk of fire is thereby diminished and the means of promoting domestic comfort provided, by introducing a fountain of unfailing water at the threshold of every man's home. So it has been in all ages of the world, the site most convenient to a source of water supply was the chosen locality for the habitation of man, and that locality was esteemed as much more valuable for its proximity to water supply, than other situations more remote, as the supply of water was considered indispensable to the necessities of life. For the same reason, when an uninterrupted supply of water is brought to the premises of a proprietor by artificial means for domestic uses and the protection of property, it attaches the same value to those premises that a natural fountain would, and explains how the intrinsic value of property is increased by water works.

The most reliable statistical information has been gathered with great pains and research to obtain a ready answer to the mooted question *whether the investment in water works*, as a pecuniary measure, will ensure remunerative returns? To all such enquiries the answer is the same as that received by the Company as to the results of several well managed water-works. Taking the average of their operations at date, the annual yield, or revenue found, was equal to \$20,000, on every 10 miles of water pipes laid; showing a steady annual increase of revenue as the population becomes greater to double and frequently three times that specified as an average. For maintaining the works in successful operation 20 per cent of the revenue should be deducted, which leaves a net revenue of \$15,000 per annum. It was also found that the permanent expense of conducting water works varies but little in supplying any number of miles of water pipes, except what arises from the small additional daily consumption of fuel required to pump a water supply.

Adopting the estimate that \$20,000 revenue is the ordinary yield from 10 miles of water pipes, taken as a basis of calculation, with \$5,000 off to defray the annual expenses, and comparing it with the contract price, the Milwaukee water works would yield  $4\frac{1}{2}$  per cent on \$325,000, the price to be paid. Then every subsequent 10 miles of pipe laid would cost never to exceed \$10,000, which is a high estimate, and this paying \$20,000 returns from revenue yields 20 per cent per annum on the outlay. The increased consumption of fuel necessary, as explained, would be the only permanent daily expense incurred, as the cost of labor and hands remains constantly the same. Taking the mean of the two extremes  $4\frac{1}{2}$  per cent and 20 per cent, from the very worst showing of the case and from moderate expectations, *at least  $12\frac{1}{2}$  per cent would be paid* on the cost of water works having 20 miles of water pipes laid. Hence it follows that every additional mile of pipe extended increases the general yield in a greater ratio than before. Nothing has been allowed here for the condensing of the population in thickly settled districts, which will perhaps add 5 per cent revenue to all old lines of pipes for every 10 miles of new pipe laid; making  $17\frac{1}{2}$  per cent annual dividends on 20 miles of water pipes, as the most probable result of practical experience. The successful operation of all water works in the United States afford the best evidence in favor of the project under consideration, and decides any question of doubt to a reasonable mind.

with regard to water works as a pecuniary investment. This assertion is strengthened by the well known fact that when stocks or bonds are brought into market none are more eagerly bought than those of water works Companies. This would seem to justify the expenditure of any amount of money that may be required in the construction of such works. Whatever be the cost of construction and expense of maintaining water works in successful operation, these form the basis upon which all assessments of rates for water supply to consumers are made, and it is the positive certainty of remunerative returns which affords the sole ground of the universal confidence known every where to exist with reference to water works as a reliable source of revenue and profit.

Much more might be said in behalf of water-works, as a means of ornament, as well as of comfort, cleanliness and safety to Cities. Jets, fountains and pools, for the embellishment of gardens, squares and public grounds, are deservedly esteemed in all large cities. But the Directors have only thought it necessary to dwell upon the various applications of Water to objects of every day usefulness, with the assurance, however, to their fellow citizens, that they will cheerfully aid and assist any arrangement or device of public or private fountains, for purposes of ornament, or enjoyment. Their plan contemplates an abundant supply of water, in anticipation of its being thus used to gratify the tastes, as well as to supply the wants of the public.

The Directors have thus endeavored to set forth, in clear and intelligible terms, what they deem to be the controlling considerations in favor of the project they have in view. They have shown that in all ages and countries of the civilized world, the object has been recognized and pursued as one of the first consequence to the health and comfort of individual man, and the progress and welfare of large communities. They have enumerated some of the more obvious and signal advantages which the possession of an abundant supply of pure water confers upon a city. They have exhibited its importance, in the preservation of the public health, in the promotion of domestic comfort, in the protection of property from fire, in the enhancement of the value of real estate, in the cleansing and adornment of the public streets and squares, in the development of productive industry, in the general saving of tax, and in the increase of capital, population and prosperity. They have demonstrated, too, that, setting all these considerations aside, the enterprise is one which cannot fail to yield a handsome and *sure* return for the money invested in it, and thus, while affording a direct and substantial profit to the Stockholders, will confer lasting benefits and high credit upon our young and enterprising city. They submit, therefore, their plans and estimates to their fellow-citizens of Milwaukee, in the confident hope that they will give them due heed, and in the undoubting conviction that having well and maturely considered the matter, they will co-operate heartily in the important work of providing our City with an ample and unfailing supply of Pure Water.

BY ORDER OF THE BOARD OF DIRECTORS.

Milwaukee, Dec. 10, 1852.

## ENGINEER'S REPORT.

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CINCINNATI, Oct. 25th, 1852.

*To the Board of Directors of the Lake Hydraulic Company, of the City of Milwaukee,*

GENTLEMEN—

The necessary examinations and surveys for maturing plans conforming to specifications for construction of Water Works, by which Messrs. Gliddon and Lockwood are bound in a contract with the Lake Hydraulic Company to supply water to the City of Milwaukee, having been made, the results with working plans for construction, are herewith submitted.

In accordance with the specific instructions given to carry out your intended objects, the observance of style throughout the work deemed most appropriate in design, without expensive or superfluous ornament, has been attentively studied, regarding permanence, effectiveness, and economy as the primary objects. The plans submitted, however, embrace all the essentials of ornament and usefulness for a superior work and all that was specified in the contract.

It is customary in taking steps to provide an adequate supply of water for any town, to ascertain first the number of inhabitants as a basis of calculation, allowing for daily consumption 30 gallons of water to every inhabitant. The city of Milwaukee is represented to contain 25,000 inhabitants, then it is probable that 800,000 gallons of water per diem will be a quantity sufficient for the demand.—Whereas the Water-Works in view have capacity to afford a supply of 3,500,000 gallons of water per diem, and employ but half the power provided for pumping, which would be considered ample for a population of 120,000. The pumping engines have been planned with a view to operate them either singly, or in connection, in order to bring their united powers in requisition under a stress of circumstances, as for instance in the emergency of fire, by which means double the quantity of water specified may be supplied, or 7,000,000 gallons of water per day. It is contemplated to continue the combined power in action when the growth of the city and increased demand for water require the operations of both pumping engines, and thus provide for a future supply of water sufficient for 240,000 inhabitants with the facilities first introduced.



## RESERVOIR.

The most essential feature of any system of water supply is the reservoir for the collection, storage, and purification of the water, and capacity is the chief point gained in any case. The reservoir for Milwaukee water works will be formed by constructing tenacious clay embankments having such base and altitude as to contain 25 feet depth of water, will be paved, terraced, and fenced, and the grounds to be embellished with promenade walks, shade trees, shrubbery, &c., and otherwise ornamented with fountains to play jets of water when desired. The reservoir will be divided into two compartments, having pipes, stop-cocks, etc., to connect and disconnect at pleasure, and maintain a constant supply in the water-pipes, and at the same time empty, clean out, or repair, either of the compartments when necessary. The contents of reservoir are equal to 15,000,000 gallons of water, which capacity was given it so that in the event of accident to the pumping engines, or any unavoidable interruption to the supply, the reservoir would furnish the present population with water one month at least without being replenished. The site selected for reservoir is such that in the lower districts of the town the head and force of water in the pipes will give a jet, by connecting here with Fire-Plugs, strong enough to extinguish fire without the aid of Fire-Engines.

The purity and healthful qualities of water for the supply of a town, is a paramount consideration. Careful analysis of Lake Michigan water shows that the source from which the supply is obtained for Milwaukee, is remarkably free from impurities which usually characterize water taken from rivers and similar sources for the supply of towns. The introduction of water into the city of Milwaukee from Lake Michigan, will be an event hailed by general rejoicing in the abundance of a pure and salubrious element which cannot be too highly estimated, for its salutary influence on health, and for promoting the cleanliness and comfort of the population.

## ENGINE HOUSE.

The locality of engine-house was chosen for close proximity to the reservoir; the situation on the beach is directly East of the reservoir. Preparatory to erecting the engine-house and pumping engines piles are to be driven, on which will be laid foundations of stone and on these again the brick and iron superstructures are to be raised. The walls of the house to be uniformly 20 inches thick and 28 feet high to the eaves, to have 50 feet front and 105 feet length, to receive the pumping engines and steam furnaces under the same roof but in separate apartments. The house to be constructed of the best quality of materials, and every precaution taken to insure excellent workmanship, to and guard against fire. The architectural design for engine-house is exceedingly well adapted for exterior finish and elegance of appearance. In the rear will be erected coal-bins of sufficient capacity to contain several months supply of fuel. And in front of the house the grounds are to be terraced, graveled, and turfed, having a flight of steps skirted with shade-trees to communicate with the reservoir. From this ascent other walks and avenues diverge and open again into lawns adorned with fountains to make the grounds in every respect an appropriate place of public resort and recreation.

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PUMPING ENGINES.

It is contemplated to erect two pumping-engines of 120 horse power each, capable of elevating 3,500,000 gallons of water at the reservoir separately, or 7,000,000 gallons of water jointly, in 24 hours. The plans for engines embrace every requisite to insure faithful performance when finished, and embody all the modern improvements. The work will be of a substantial character, having been designed especially for withstanding severe duty and hard strain to which water-works machinery is frequently subjected from deranged action of the pumps. The mounting, workmanship and finish on the engines will compare favorable with any similar work in the Union, when done.

The proximity of the pumping engines to the reservoirs, is a fortunate circumstance in view of economy, inasmuch as, it cheapens the cost of construction and affords easy propulsion of water to the reservoir from the slight resistance of friction to the pumping power, which gains a permanent economy of fuel as the result.

There will be two Rising Mains or supply-pipes, of 16 inches diameter, leading from the pumps to the reservoir, to be used in connection or separately as the case may be, in the same manner as the pumping-engines. A certainty of supply being thus made doubly reliable in the event of accident to either of the mains or engines, as every part will be duplicated to supply the reservoir with water by one or the other at pleasure. The successful attainment of this end unites in one general system, such a thorough combination of the parts by a very simple arrangement that any single appliance, or the simultaneous action of the whole system, may be brought in requisition when required. Which provides for any possible contingency and maintains an uninterrupted supply of water.

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SUCTION OR AQUEDUCT PIPE.

The pump suctions will dip into tanks or basins, constructed of stone beneath the iron foundations of the engines. These basins are to be supplied with water through vaulted channels of brick, fed by a 35 inch iron suction or aqueduct which enters the engine-house underground, and extends out into the Lake at a depth of water and distance from the shore sufficient to obtain a pure and healthful supply of water for the pumps. The turbidness of the water incident to the Lake shore occasioned by the prevalence of high winds will be avoided in this case; although ample provision has been made by the capacity given there servoir, for deposit of all impurities previous to the distribution of water for use.

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DISTRIBUTION.

There will be ten miles of distributing pipes, commencing at the reservoir with a 16 inch descending main as the main artery. Various lines of pipes from 16 inches to 4 inches diameter, drawing water from the main artery, will divert the water into pipes and channels equally distributed over the whole district to be supplied.

For the convenience of attaching service pipe to deliver water on the premises of water tenants, and for attaching and detaching fire-plugs, and for making repairs and to extend water-pipes, stop-cocks or water-gates will be placed at frequent intervals on the different lines of pipes, to shut off and let on the water as occasion requires, and every other necessary appendage will be included to make the system of supply replete with all the details of usefulness.

The cost of the water-works described for Milwaukee being a question settled by stipulation, in consideration of \$325,000 to be paid by the Lake Hydraulic Company to Messrs. Gliddon & Lockwood for construction, obviates the necessity of estimates of cost which usually accompany Engineer's reports. The matter rests between two parties mutually bound in a contract. There are certain conditions to be fulfilled on one part, and a specified sum to be paid on the other part, which determine the positive, cost, and character of the work to be constructed. To append to this report approximate estimates, exhibiting a probable cost differing from the well-known result merely for comparison, would appear superfluous and absurd. The estimates are consequently omitted.

This however, in conclusion, may be a proper occasion to remark that the expedient resorted to by the Company to secure the objects of their enterprise by contract and relieve themselves of the burthen of troubles attending the prosecution of a work of such magnitude with their inexperience in such matters, was not an unwise policy. The course adopted involves neither chance nor risk, but insures the accomplishment of the undertaking for a consideration paid which may or may not liberally compensate the contractors. That depends wholly upon circumstances which cannot affect the interest of the Company. It frequently happens with enterprising men, thoroughly experienced and competent to undertake and execute heavy work of like character, that the cost, from a multiplicity of causes, much exceeds previously made, reliable estimates. Such unlooked for results arise principally from "strikes" among hands employed, demanding higher wages; "advanced prices of materials" for construction; "seasons unfavorable to operations;" consequent delays, heavy losses and damages incurred, "financial pressures," and numerous like contingencies which never enter into the estimates of cost which swell up the bills of expense beyond any anticipated outlay.

With these brief remarks the accompanying plans and specifications for the construction of water-works for Milwaukee, are placed before you. At the same time assuring you that every endeavor has been used in the maturing of plans to render mutual satisfaction to the contracting parties in order to insure the faithful execution of the work in strict conformity with the requisitions of their contract.

Respectfully submitted.

THEO. R. SCOWDEN, Engineer.

OFFICERS AND DIRECTORS,  
OF THE  
LAKE HYDRAULIC COMPANY.

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**DIRECTORS,**  
ALEXANDER MITCHELL,  
JAMES KNEELAND,  
HANS CROCKER,  
ANSON ELDRED,  
JOHN LOCKWOOD.

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*President,* HANS CROCKER,  
*Treasurer,* ALEXANDER MITCHELL,  
*Secretary,* RUFUS KING,