First Annual Report

Kennebec Water District



FIRST

ANNUAL REPORT

OF THE

TRUSTEES AND OFFICERS

OF THE

KENNEBEC WATER DISTRICT

FOR THE

PERIOD ENDING APRIL 30, 1906

WATERVILLE, MAINE:
WATERVILLE SENTINEL PRESS
1906

OFFICERS KENNEBEC WATER DISTRICT

Trustees

FREDERICK C. THAYER of Waterville
VIRGIL R. CONNOR of Fairfield
IRA E. GETCHELL of Winslow
STEPHEN A. NYE of Fairfield
GEORGE L. LEARNED of Waterville

President

FREDERICK C. THAYER

Clerk and Treasurer

GEORGE K. BOUTELLE

Counsel

HARVEY D. EATON

Superintendent

ALBERT S. HALL

OFFICE

MASONIC BUILDING, COMMON STREET,

WATERVILLE, MAINE

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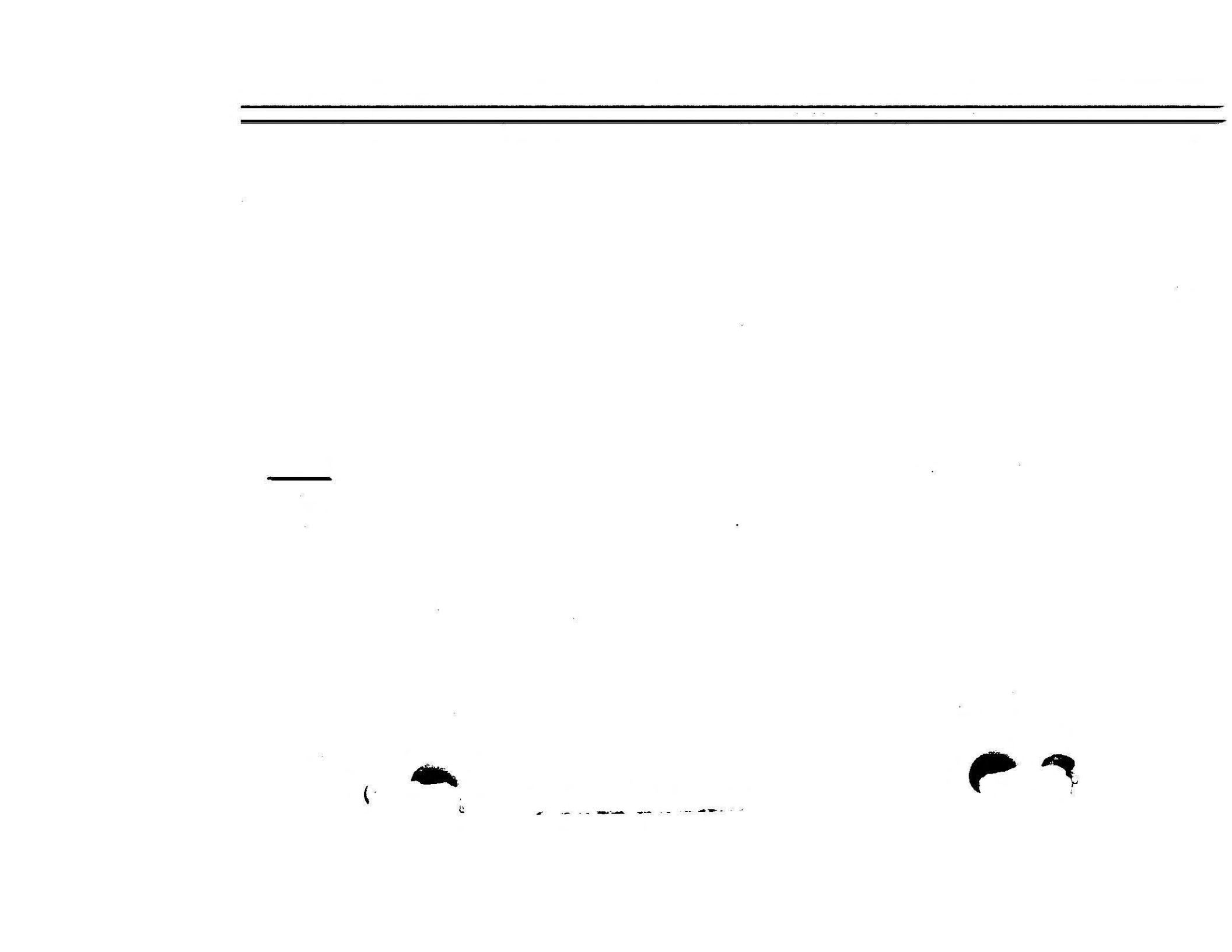
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TRUSTEES' REPORT

The trustees of the Kennebec Water District beg leave to submit herewith a detailed report of the origin and operations of the District to the close of business on April 30, 1906.

ORGANIZATION

The District is incorporated under Chapter 200 of the Private & Special Laws of Maine, approved March 17, 1899.*

The territory included in the District was the City of Waterville and the Fairfield Village Corporation and the Act did not become operative until approved by popular votes in both places. The City of Waterville voted its approval on the first day of April, and the Fairfield Village Corporation did the same on the third day of April, 1899.

The District was also authorized to operate in the towns of Benton and Winslow but these towns are not a part thereof.

Trustees were chosen immediately afterward as follows:

By the municipal officers of Waterville Dr. Frederick C. Thayer and Mr. Walter S. Wyman, both of Waterville.

By the municipal officers of the Fairfield Village Corporation Mr. Stephen A. Nye and Mr. Virgil R. Connor both of Fairfield.

* Printed herewith on page 23.

By the County Commissioners of Kennebec County Mr. Ira E. Getchell of Winslow.

The first meeting of the trustees was held and organization completed April 13, 1899.

Dr. Frederick C. Thayer was elected President of the board, and George K. Boutelle, Esq., Clerk. Harvey D. Eaton, Esq., was chosen counsel.

The trustees determined the duration of the first term of office of each one by lot as follows: Mr. Connor one year; Mr. Wyman two years; Mr. Getchell three years; Mr. Nye four years; Dr. Thayer five years.

CONDEMNATION PROCEEDINGS

It was then voted to instruct the attorney to notify the Maine Water Company that the District desired to acquire the entire plant, property and franchises, rights and privileges, held by that company within the District, and the towns of Benton and Winslow, and to ask the company to name the terms upon which it would sell the property.

The attorney at once wrote the Maine Water Company in accordance with this vote and being soon after informed that the company would make no reply, he presented the information to the trustees on the 24th of April, whereupon it was voted that a bill in equity be filed by the District through its trustees, for the purpose of securing judicial appraisal and condemnation of the entire plant, property and franchises, rights and privileges, held by the Maine Water Company within the District and the towns of Benton and Winslow, as provided by the act of incorporation.

Such a bill was drawn and filed in the Supreme Judicial Court on the 28th of April, 1899. The litigation which ensued has become notable. Eminent lawyers were engaged by the water company and an earnest effort made to defeat the purposes of the District. Numerous objections were interposed and much delay ensued. Hon. Orville D. Baker was engaged to act as senior counsel for the District with Mr. Eaton.

The first stage of the case involving the legality of the act and the right to proceed under it finally came to argument before the law court at Portland in August, 1900. The court's decision was rendered in March, 1902. It was lengthy and sweeping. The act was completely sustained. Its constitutionality and the legality of all its provisions were upheld. At about this time by mutual agreement Mr. Baker left the service of the District and soon after entered that of the Maine Water Company in which he remained till the litigation was over. Mr. Ezra R. Thayer of the Boston Bar was then engaged with Mr. Eaton and remained till the proceedings for condemnation were completed. The next step was to procure the instructions of the court to the appraisers as provided in section 8 of the District's charter. Each party presented numerous and comprehensive requests for instructions covering every phase of the appraisal that could be foreseen.

Arguments in support of the various positions taken were submitted to the law court during the summer of 1902 and on the 27th of December in the same year the court published its decision giving the instructions it thought proper. It is said by lawyers that this opinion of the court is one of the most complete and exhaustive ever rendered by any court on the subject of water works valuation.

After months of investigation and some discussion with the water company it was agreed by counsel on both sides that the court should appoint as appraisers of the property Hon. Frederick A. Powers of Houlton, one of the justices of the Supreme Court, Hon. Frederick H. Appleton of Bangor and Percy M. Blake, Esq., a hydraulic engineer of Hyde Park, Mass. The appointments were made and October 6, 1903, was fixed upon as the date for the appraisal to begin. Months before that, however, some of the best engineers and sanitary experts in the country had been employed to make a thorough investigation of the property and of all the other matters having a bearing on its value. By far the most important of these other matters was the pollution of the Messalonskee stream from which water was taken. The awful possibilities involved in this pollution had long been

feared by physicians and thoughtful citizens but the situation was never generally realized till the winter of 1902-3. During that winter an epidemic of typhoid fever broke out in the community resulting in 726 cases with 74 deaths; 371 of these cases with 40 deaths occurred here and the balance were at Augusta. The sanitary expert engaged by the District Mr. George C. Whipple with Dr. Ernest C. Levy, his chief assistant, arrived while the epidemic was at its height and at once commenced an examination into the history and circumstances of each individual case. This work covered a period of more than six months but the result was conclusive and undisputed proof that the disease had been distributed among our people by the water of the Messalonskee stream.

Up to this time under the provisions of the charter the District had an option to drop the proceedings for condemnation if it saw fit. The trustees felt no doubt whatever as to the propriety of going on and so far as could be learned the people of the entire District were absolutely unanimous in their desire to take the ownership and management of this great public utility into their own hands.

The hearing, therefore, began as agreed on October 6, 1903, and proceeded rapidly to a close which came on October 30. In another week the appraisers announced their award of $503,475.37 as the value of all the property, rights and franchises of the Maine Water Company within the District and the towns of Benton and Winslow. The award seemed large to us then and does now but it was a large piece of property which was earning its owners a handsome income. There had already been much litigation and we had no faith that to prolong it by appeal or other process would result in reducing the amount. We therefore made no formal objection to the award but paid over the amount and took possession on the 9th of May, 1904, though the award took effect and the works were operated on the District's account from Nov. 1, 1903. Private ownership of the public water system was thus terminated and the ownership and control thereof became fully vested in the District.

HISTORY OF THE WATER COMPANY

RELATIONS WITH PEOPLE

A brief glance at the history of the private company may not be out of place at this point.

The Waterville Water Company was first chartered in 1881 with the following members: Samuel Appleton, S. I. Abbott, I. S. Bangs, F. E. Heath, Nathaniel Meader, John Ware, E. F. Webb, W. B. Arnold, G. A. Phillips and J. W. Philbrick all of Waterville. The only sources of supply granted in the charter were Snow pond and the Kennebec river. Section 9 provided that the company should furnish to the town of Waterville free of expense a supply of water for public buildings, schoolhouses and the extinguishment of fires. The original records have now been lost or destroyed by the company but an organization was effected under the charter and at the town meeting held March 16, 1885 the town was asked to waive its right to receive a supply of water free of expense and thereupon it was voted "That the town waive its right or any rights which it may have, as mentioned in this article."

Evidently at this date the incorporators hoped to install the works themselves and were trying to lay the foundation for an income that would support them.

During the year, however, that hope seems to have vanished for on Jan. 23, 1886, a special town meeting was held at which the water company presented two propositions:

The first was that the town should contract for fifty hydrants at fifty dollars each per year for twenty years in which event the contract and the company's charter were to be assigned to Parks & Wheeler of Boston who would then build and own the works and all the property and franchises.

The second proposition was in these words: "To see if the town will vote to assume the charter of the Waterville Water Company and erect the necessary works to supply the inhabitants of Waterville with pure water and raise the necessary amount of money therefor or take any action therein."

The members of the company allowed no doubt to arise as to their position in the matter. While they had received the

suggestion from Parks & Wheeler and thought it should be presented to the town they argued and voted against it and urged their fellow citizens to assume the charter, which they offered as a free gift, and to build the works for themselves.

The public issue involved was squarely presented and aroused much discussion. The day before the town meeting the Waterville Mail printed an editorial evidently inspired and approved by the members of the water company which, after stating reasons why the Parks & Wheeler proposition should not be accepted, closed with the following statement:

"Now on the other hand the town has the opportunity to assume the charter granted by the state, and become its own Water Company, making its prices, and applying its profits to public expenses. There are large profits to be made in this business and the public may as well have them as a favored few."

The meeting was held at the time fixed and the first proposition was defeated. Upon the second proposition, however, there was much variety of opinion and a long and warm discussion ensued resulting only in the appointment of a committee of seven to investigate the whole matter including the right of the town to assume the charter. This latter question could of course have been settled beyond all doubt by a special act of the legislature.

The committee appointed was Reuben Foster, Town Agent; Moses Lyford, F. A. Waldron, S. S. Brown, Wm. T. Haines, Geo. E. Shores and C. G. Carleton.

The meeting was then adjourned to Feb. 13, 1886, at which time the record says:

"Upon the recommendation of the committee appointed under Article Three of the warrant it was voted that the charter of the Waterville Water Company be and hereby is assumed and accepted by the town of Waterville and that a committee be appointed by said town to investigate as to the best methods for carrying out the purposes contemplated by said charter, said committee to report at some future meeting to be called."

Thereupon Moses C. Foster, Dr. N. G. H. Pulsifer, Geo. E.

Shores, C. G. Carleton and Charles H. Redington were appointed a committee and the meeting adjourned again for one week.

At the adjourned meeting held on Feb. 20, 1886, the proposal to turn over the company's charter was put in more formal shape and it was asked that the town take the plans and specifications at cost not exceeding one thousand dollars and vote to construct the works from Snow pond, commencing in the spring of 1886 and completing the work by Dec. 31, 1887.

There was also another new and lengthy proposition for a contract under which the company was to build and own the works taking water from Snow pond, furnish hydrants, etc., and allow the town to purchase at an appraisal after ten years.

This proposition was plainly inspired by outside parties who had begun to take an interest in the matter and so fickle were our people that they reconsidered the vote of the week before accepting the charter, voted not to accept said charter, then voted to accept the new proposition and adjourned.

The contract thus made seems to have been abandoned by mutual consent though an act was passed early in the session of the next legislature ratifying it and making it valid. Later in the same session, however, an act of far more serious consequence was passed. Under it the company's franchise was extended to cover Fairfield and Winslow, the duty to furnish water free of charge which had already been waived by the town was struck out, the right to take water from Snow pond was repealed and instead there was given the right to take water from the Messalonskee stream. These changes undoubtedly tended to the greater financial success of the enterprise but the effect upon the public health and welfare was of a very different character.

At the annual town meeting in March, 1887, a new proposition was submitted by the water company, now confessedly owned and managed by outside parties. This was similar to the one that had been agreed to the year before but embodied the changes made necessary by the revision of the charter. It provided that water should be taken either from the Kenne-

bec river or the Messalonskee stream at the option of the company, that pipes should be laid in twenty-six streets which were named, that forty hydrants were to be set and that the rates for domestic service should not exceed those then charged by the Gardiner Water Company. It was further provided that at the end of ten years the town should have the right to take and pay for the works at such price as might be agreed on by the parties, or failing to agree, then at such price as might be determined by three disinterested persons to be appointed by the Supreme Judicial Court. There was no provision for sprinkling streets, flushing sewers or supplying schoolhouses and other public buildings.

In this form the proposition was accepted and the selectmen were authorized to sign and execute the contract. The meeting was adjourned for two weeks (until April 5, 1887) and at the adjourned meeting still further changes were suggested by the water company, the one of chief importance being to strike out the option of purchase. As an offset to this they proposed to give fifty hydrants at forty dollars each per year instead of forty at fifty dollars each as before agreed. The new proposal met with warm opposition, much discussion ensued, a committee was appointed, conferences were held and amendments offered but the company held fast to its position and after a month more of negotiation the contract was actually executed in the form proposed by the company on the 5th of May, 1887.

Not long afterward a similar contract was made with the Fairfield Village Corporation and thus there passed into the hands of a private company, whose active members were all non-residents of the territory served, one of the most valuable franchises which the people of this community ever had at their disposal.

The works were constructed during that season. In the early winter water was pumped into the system and for the next seventeen years the people were supplied with Messalonskee water.

In 1889 the Maine Water Company was organized and under it the ownership of several plants including the one

here was consolidated. In 1893 authority was granted to extend the system into Benton.

SEARCH FOR NEW SOURCE OF SUPPLY

The situation which had grown up under the legislation and contracts above set forth was turned over to the District in the spring of 1904. Long before that time your trustees had become fully aware of the frightful dangers attending the use of Messalonskee water. The selection of a new source of supply had been receiving attention for years. All the nearby lakes were considered but without reaching any conclusion. In May, 1902, Mr. Wm. R. Hill, Chief Engineer to the New York Aqueduct Commission, came here and went over the whole situation examining all the lakes and ponds of the Messalonskee system, Pettee's pond and China lake. He took samples of the waters for analysis and after considering all features of the matter made a report which was published at the time strongly advising the choice of China lake. No decision was then made but the matter was kept in view during the investigations of the next two years.

FILTRATION

At the hearing on appraisal of the water plant much testimony was introduced in an attempt by the water company to show that Messalonskee water could be made entirely satisfactory by filtering for much less than it would cost to procure a supply from any of the neighboring lakes. The statements to this effect were so positive and plausible that we felt it our duty to investigate for ourselves.

Accordingly in March, 1904, all the members of the board, except Mr. Nye, together with Mr. Eaton and Mr. Metcalf made a trip to Philadelphia stopping at Boston, New York, Little Falls, N. J., and a few other places to observe the work of construction and the actual operation of various filters.

We saw filters of the English or slow sand type and others of the American or mechanical type. The plants visited are said to be among the very best in the world of their respective types and we saw no reason to doubt their great efficiency but we returned with a strong conviction that we ought to take no chances with the sewage of Oakland, when pure water could be had at an expense of approximately $250,000.

The final decision in regard to a source of supply was then made and our unanimous choice was China lake. Subsequent observation and the actual test have confirmed our belief that this was the right thing to do.

CHINA LAKE PIPE LINE

Mr. Leonard Metcalf of Boston was engaged as chief engineer in March, 1904, and the work was pushed as rapidly as possible. The system of distribution pipes in the streets was in great need of enlargement and extension, but we were advised by counsel that we had at that time no authority to borrow money with which to do such work and our attention was therefore confined for that year to the subject of new supply for which purpose we had express authority from the legislature to borrow money.

Contract for Pipe

Our first large contract for that work was with R. D. Wood & Co. of Philadelphia for eight and one-half miles (about 4,200 tons) of 20 and 24 inch cast iron pipe.

The dates when casting, shipment and delivery of this pipe should begin and be completed were distinctly specified but before the time for shipment arrived our inspector at the foundry advised us that casting had not begun as specified and we soon found ourselves in most serious difficulties with the pipe people. Such flagrant and reckless disregard of contractual obligations on the part of really responsible people we had never met before. We knew that to let matters drift and seek damages through the courts would be anything

but satisfactory and we therefore went to Philadelphia with our engineer and counsel. Our sessions with the pipe people were prolonged and stormy. We demanded that they buy pipe from other dealers so as to begin delivery on time. They finally acceded though protesting much against it. Later we insisted on their purchasing still more and finally we ourselves purchased several hundred tons direct from the Warren foundry. In all more than two thousand tons was procured from foundries other than those of R. D. Wood & Co. The extra cost of this pipe together with our expenses we deducted from the contract price. This aroused further vehement protest and numerous earnest efforts have been made to induce us to change our decision. We felt that it was right, however, and declined to do so.

Contract for Construction

The next important contract was for the construction work on the China lake line. The surveys and preparation of specifications occupied the months of April, May and June, bids being called for under date of June 28. Six proposals were received and opened on July 12. The figures given were in round numbers as follows: $66,000, $75,000, $76,000, $93,000, $103,000 and $105,000. We caused careful and thorough investigation to be made at once and soon became satisfied that the work could not be done for the price named by the lowest bidder. To award him the contract we felt certain would result in trouble and probable failure. We therefore decided not to accept this bid and gave our attention to the next two whose bids differed by about $1,000. Both parties were shown by all reports to be responsible and reliable but various minor matters made it seem best to engage Mr. Loring N. Farnum whose bid was the higher of these two. Mr. Farnum had an excellent reputation in the business world having performed many large contracts with satisfaction to his employers and financial success for himself.

Besides furnishing him all the engineering data and specifications we had him make a second and special visit here to look the situation over and hold a conference with us on the

ground. The difficulties which had arisen with the pipe people were fully explained and he assured us that it was not the first instance of the kind he had met with in the same people. He believed, however, that he might assist somewhat in dealing with them and that with the vigorous measures we were taking the pipe might be secured and laid that season.

With this full investigation and thorough understanding of all conditions the contract was signed July 22, 1904, and five days later a bond for its performance in the penal sum of $25,000 was furnished by the contractor. It was provided that work should commence within seven days and be completed not later than December 15, 1904, and that damages to the amount of fifty dollars per day should be paid for delay in completion beyond the date fixed. To all appearances the work began auspiciously and continued so for some weeks but as the season advanced we found the work did not progress as it should. The crews of men were too small, important parts of the work were being delayed, tests of the work already done were asked for by the engineer and refused by the contractor, and a generally unsatisfactory condition developed. As cold weather approached Mr. Farnum repeatedly asked to be allowed to suspend all operations until the next season. We felt that it was his duty and ours to redouble effort and so told him. Financial weakness began to appear. We gave all the assistance by way of anticipating payments to him that we could without injuring the security of his bond. All efforts, however, proved unavailing. Winter set in with great severity while the work was far from completion. The contractor struggled on at great disadvantage till the close of work on January 4, 1905. At the meeting held that evening Mr. Farnum informed us that he was unable to continue and then and there abandoned the work.

Completion by District

This contingency had been provided for in the contract and under that provision we took possession of all the tools and material on hand, arranged with the superintendent and

office force, and the work went on next morning while but few knew that any change had taken place. Every bill legitimately contracted in connection with the work was paid. The remainder of the work was completed as economically as possible for the sake of Mr. Farnum as well as the District but the final result showed excess cost over the contract price of $31,246.37. Besides this the damages for delay in completion amount to nearly $8,000.

Farnum Suits

For all this Mr. Farnum and the surety upon his bond (the U. S. Fidelity and Guaranty Co.) are responsible. Suit has been brought and is now pending in the United States Circuit Court to recover the amount of the bond, $25,000. We see no reason why this amount should not be recovered from the surety company. Upon the other hand Mr. Farnum claims that the District owes him a balance of $24,000 and has brought suit for that sum. We are unable to see ground for any liability whatever to him. We not only performed every term of the contract incumbent on us to perform but assisted him in many ways entirely outside the contract. The whole matter will be finally settled in the Federal courts and we await that settlement with perfect confidence.

China Lake Water Introduced

Final completion of this work was reached early in May, 1905. There was much washing out and flushing of pipes, all the hydrants were blown off, the reservoir was drained and cleaned and on May 23, China lake water was fully turned on to the entire system. The intake from the Messalonskee stream was closed and sealed at the same time. It has not since been opened and we sincerely hope that no necessity for opening it will ever arise.

IMPROVEMENT OF DISTRIBUTION SYSTEM

Proper authority having been obtained from the legislature for the improvement of the distribution system that subject was taken up early in the year 1905. All the engineers who investigated the plant for the purposes of appraisal united in the opinion that the main arteries leading through the system were utterly inadequate to supply the demand that might be made at any time by a large fire. This view was stated by such eminent engineers as Mr. Wm. R. Hill to whom we have already referred, Mr. Freeman C. Coffin of Boston and Mr. John R. Freeman of Providence, R. I., a member of the commission on additional water supply for the city of New York, who is recognized as the first authority in the country on the subject of water works with reference to fire protection. Mr. Gorham Dana, an engineer who acts in an advisory capacity to the great fire insurance companies, expressed the same view. It was a well-known fact that the city of Waterville had doubled in size since the works were planned and beside this the requirements as to capacity and efficiency of pipe systems had materially increased. We therefore felt it to be the plain duty of the District to provide the additional pipe capacity which seemed to be required. Mr. Metcalf prepared plans based on original study of the situation as well as the criticisms above mentioned. In a general way these plans provided for enlargement of the main arteries running from the pumping stations through the entire system from the lower end of the Plains in Waterville to the upper end of Fairfield and also for practically new and complete systems in Benton and Winslow. Bids were called for in April and opened on the 29th of that month.

Contract for Street Mains

Only three proposals were received and the figures were in round numbers $37,000, $47,000, and $56,000. It was soon found that the lowest bidder, the Boylston Construction Company, was a partnership of reliable men and the contract was

awarded them. Pipe was purchased from the Warren Foundry at a cost of $51,615.40 and work began in May. The delivery of pipe was completed within the time fixed and the work of laying was prosecuted steadily and successfully till its completion in the latter part of September. The contractors earned the approbation of your trustees and we believe of the public generally. They came in close contact with a great many people as the work was nearly all performed along streets with houses fronting thickly on either side. The work was well done and the annoyance to the public was kept at a minimum.

Pumping Stations

Beside the important operations above mentioned a new steam pumping plant has been installed involving the reconstruction of station No. 2 and the building of large additions thereto, so that now in case of failure of water power or accident to those pumps we have our own steam plant directly connected with the China lake line while heretofore on such occasions the only resource was to the pumps of the Maine Central Railroad Company, the Lockwood Company or the Hollingsworth & Whitney Company all drafting from the Kennebec river.

The water power pumps have been overhauled, No. 2 having extensive repairs and changes to fit it for the China lake pressure while the dam has been made tight thereby saving much power which had been going to waste for years.

All these operations together with many others which we have not mentioned are set forth fully in the admirable report of Mr. Metcalf printed herewith and to which reference may be had for further information.

DISTRICT FINANCES

The financial transactions of the District have been of considerable magnitude and at times the source of much anxiety.

New Legislation in Maine

When the act was passed it created a new form of organization hence its securities were not mentioned in the statutes designating investments for savings banks. The advantage that would accrue if they were so was foreseen and Mr. Eaton prepared and procured the passage of an amendment to the general law relative to investment of savings bank funds allowing them to purchase the bonds or other obligations of water districts. This act was passed by the legislature of 1903 and has been incorporated in the Revised Statutes, chapter 48, sec. 23g. In the fall of that year the Gardiner Water District sold its bonds which were thirty year four per cents. It was generally understood that the new act helped the sale of the Gardiner bonds materially but we soon found that an issue as large as ours would be too much to expect the Maine savings banks to absorb.

New Legislation in Massachusetts

In January, 1904, Mr. Eaton conceived the notion of procuring legislation in Massachusetts allowing the savings banks of that state also to invest in our bonds. This effort met no encouragement whatever at first. Mr. Thayer of the firm of Storey, Thorndike, Palmer & Thayer, wrote "I doubt if I should regard the chance of having it passed as considerable enough to justify the trouble of trying to get it through, but as you think otherwise I will gladly have it introduced." A prominent financier who was consulted said the District could afford to spend fifty thousand dollars to procure the passage of such an act. The Savings Bank Commissioners were consulted and finally agreed not to oppose the measure which was then introduced and referred to the committee on banks and banking. At the time fixed for hearing we invited the trustees of the Augusta and Brunswick districts to appear with us before the committee. Brunswick sent a delegate but Augusta did not. We also secured the attendance of a few prominent savings bank men

from Maine and of the treasurer of the largest savings institution in Massachusetts. To our satisfaction no serious opposition developed and the bill was finally passed and approved. Its importance may be judged from the fact that the savings banks of Massachusetts have resources nine times as great as those of Maine. Our expenses in procuring the passage of this act including fees paid counsel in Boston amounted to $1,299.11. We invited the Augusta and Brunswick districts to share this expense. Augusta promptly paid $433.03 but Brunswick never responded. The value of this legislation to the District is shown by the fact that our bonds brought $60,000 more than they would at the price realized by Gardiner which made the last sale before the passage of the act was procured. We do not overlook the fact that financial conditions had improved in the meantime but for all that an issue as large as ours would have been a drug on the market had their sale been confined to the savings banks of Maine alone. Good bond men have said that without this act our bonds could not have been sold at a price to net less than four per cent. interest which would have been over $100,000 less than they actually brought.

Temporary Loans

When the award of the appraisers was made in November, 1903, we found it impossible for a time to procure funds with which to meet it. The first substantial progress made was a loan of $100,000 from the Belfast Savings Bank early in December. This was increased to $200,000 in a short time. A few other loans of from $5,000 to $25,000 each gave us only a little more than half what was needed. At length early in May, 1904, after passage of the legislation in Massachusetts above referred to we procured a temporary loan in Boston of $800,000 to be taken as needed all the notes falling due May 1, 1905, at which time we believed we should know the extent of our needs and be in position to make a permanent bond issue. With the money thus procured we completed the pay-

ment due the Maine Water Company, took up the other loans as they fell due and carried on the construction work until May, 1905.

Bond Issue

Prior to that date it had become apparent to us that a bond issue of $950,000 would be required. It was decided to issue 3 1-2 per cent. bonds and make them payable as follows: $50,000 in 5 years; $100,000 in 10 years; $150,000 in 15 years; $650,000 in 20 years.

The issue brought $932,340 an average price of .9814. In comparing this with the prices for which the bonds of the Gardiner and Augusta water districts were sold it should be remembered that all those bonds bore four per cent. interest and were on thirty years time.

Under the amendment to the charter passed in 1905* our bonds can be refunded when they fall due in case the sinking fund is not sufficient for their payment while the frequent dates of maturity afford opportunities to apply the sinking fund to that purpose which we believe is better than accumulating it for a long period of years. Had the bonds all been issued for 30 years the sinking fund would have reached a large sum the care and investment of which would have involved much labor and responsibility to say nothing of the risk of loss.

Treasurer's Report

Mr. Boutelle's report as treasurer printed herewith presents a very full and lucid discussion of all these financial topics together with itemized accounts of every dollar received or expended. We especially commend that report to the attention of every citizen of the District.

Legal Expenses

The legal expenses to date amount to $40,162.58. Of this amount $2,500 was paid to Hon. Orville D. Baker for services,

* Printed herewith on page 29.

$7,383.25 to Storey, Thorndike, Palmer & Thayer for services and expenses and $25,000 to Harvey D. Eaton, Esq. This payment to Mr. Eaton covers not only his services in full but also his expenses in connection with the matter up to Jan. 1, 1904 and besides that the entire expense of the prolonged agitation, discussion, legislative campaign, etc., which preceded the actual organization of the District. At the end of the year 1903 we asked Mr. Eaton to render a bill which he did in the sum of $25,000. After some weeks' consideration we awarded him $20,000 in full to Jan. 1, 1904. During the year 1904 the legislation in Massachusetts was procured wholly through his initiative and largely through his efforts. He also negotiated the loan of $800,000 and rendered constant service in the active operations of that year. At the end of the year he requested payment of the amount taken off from his bill the year before $5,000 and this was voted whereupon he stated that he should make no further charge for services but would be glad to render assistance to the District as long as the trustees might find it acceptable. He has continued to perform the duties of counsel and is in charge of the important litigation now pending. He was also the author of the entire arrangement for the bond issue.

THE UNDERTAKING VIEWED AS AN INVESTMENT

We are pleased to find that the District's whole undertaking viewed simply as an investment is already justifying itself. The gross income for the year ending April 30, 1906, was $45,665.84 while the interest charges and operating expenses amounted to $44,947.97 leaving a surplus of income amounting to $717.87. But the gross income for this year increased over that of the year before by $1,705.72 and we have every reason to believe that this rate of increase will continue for many years to come as the entire territory served is gaining steadily in wealth and population.

Sinking Fund

The sinking fund account has not yet been opened as the original construction account can not be closed till final settlement with Mr. Farnum and his surety. It is hoped, however, that this will be reached during the year and the sinking fund will then receive a constantly increasing surplus devoted exclusively to payment of the district debt.

MEETINGS AND RECORDS

Since organization your trustees have held 214 meetings varying in length from a few minutes to midnight sessions, the usual time consumed being about two hours. Mr. Boutelle has served as clerk from the beginning and has kept a more full, complete and perfect set of records than we ever saw elsewhere. We do not believe they can be surpassed in New England.

PERSONAL

The personnel of the board remained unchanged from the beginning until the expiration of Mr. Wyman's second term on the first Monday of April, 1906. Mr. Wyman brought to his position special training as an engineer and practical experience gained in water works employment. These qualities proved valuable to the District and were appreciated by us.

CONCLUSION

In conclusion we wish to express a modest degree of satisfaction in our work. Our service has extended over a period of seven years. In that time municipalization has been completely accomplished. The operation of this great plant vitally affects the welfare of the whole community. Its own-

ership and managment has been legally and constitutionally taken from the non-resident private corporation and vested absolutely in the people. The water which was a constant menace to the health and life of every citizen has been made pure and safe. Improvements and extensions have been made to the extent of three hundred and seventy-five thousand dollars. All this has been done without the increase of a single water rate.

As your agents and servants we have been profoundly impressed with the importance of our duties. No partizan or political interest has ever influenced our action. The books show no instance of a divided vote in this board. Every proposition submitted has had to wait until it secured substantially unanimous approval before it was adopted.

The problems of government and business administration continually arising still engage our constant attention and to them we promise to devote the best thought and effort of which we are capable.

May 15, 1906.

F. C. THAYER, President,
V. R. CONNOR,
S. A. NYE,
I. E. GETCHELL,
* G. L. LEARNED.

* Mr. Learned became a trustee April 10, 1906, succeding Mr. Walter S. Wyman, whose term had expired.

Kennebec Water District Charter

STATE OF MAINE.

In the Year of Our Lord One Thousand Eight Hundred and ninety-nine.

An Act to Incorporate the Kennebec Water District.

Be it enacted by the Senate and House of Representatives in Legislature assembled as follows:—

Section 1. The territory and people constituting the City of Waterville and the Fairfield Village Corporation, shall constitute a body politic and corporate under the name of the Kennebec Water District, for the purpose of supplying the inhabitants of said District and of the towns of Benton and Winslow and all said municipalities with pure water for domestic and municipal purposes.

Sec. 2. Said District is hereby authorized for the purposes aforesaid, to take and hold sufficient water of the Kennebec river, the Messalonskee stream or its tributary lakes, or the Sebasticook river or its tributary lakes, and may take and hold by purchase or otherwise, any land or real estate necessary for erecting dams, power, reservoirs or for preserving purity of the water and water shed, and for laying and maintaining aqueducts for conducting, discharging, distributing and disposing of water.

Sec. 3. Said District shall be liable for all damages that shall be sustained by any persons or corporations in their property by taking of any land whatsoever or mill privileges within the District or water from Snow pond, or by flowage, or by excavating through any land for the purpose of laying pipes, building dams or constructing reservoirs. If any persons sustaining damages as aforesaid and said corporation shall not mutually agree upon the sum to be paid therefor, such person may cause his damage to be ascertained in the same manner and under the same conditions, restrictions and limitations as are or may be prescribed in case of damages by the laying out of highways.

Sec. 4. Said District is hereby authorized to lay in and through the streets and highways thereof, and of said towns of Benton and Winslow, and to take up, repair, and replace all such pipes, aqueducts and fixtures as may be necessary for the objects above set forth, and whenever said District shall lay any pipes or aqueducts in any street or highway, it shall cause the same to be done with as little obstruction as possible to the public travel, and shall at its own expense without unnecessary delay cause the earth and pavement removed by it to be replaced in proper condition.

Sec. 5. All the affairs of said Water District shall be managed by a board of trustees composed of five members. Two of said trustees shall be chosen by the municipal officers of Waterville, two by the municipal officers of the Fairfield Village Corporation, and one shall be appointed by the county commissioners of Kennebec County from outside said District. As soon as convenient after the members of said board have been chosen, said trustees shall hold a meeting at the City rooms in the City of Waterville, and organize by the election of a President and Clerk, adopt a corporate seal and when necessary may choose a Treasurer and all other needful officers and agents for the proper conduct and management of the affairs of said District. At said first meeting they shall determine by lot the term of office of each trustee so that one shall serve for one year, one for two years, one for three years, one for four years and one for five years; and whenever the

term of office of a trustee expires, the body which appointed said trustee shall appoint a successor to serve the full term of five years; and in case any other vacancy arises it shall be filled in like manner for the unexpired term. They may also ordain and establish such by-laws as are necessary for their own convenience and the proper management of the District's affairs. The term of office of trustees shall begin on the first Monday of April. Said trustees may procure an office and incur such expenses as may be necessary. They shall render their services without compensation, but shall receive an allowance of two dollars apiece for each meeting of the board actually attended.

Sec. 6. Said Water District is hereby authorized and empowered to acquire by purchase or by exercise of the right of eminent domain, which right is hereby expressly delegated to said District for said purpose, the entire plant, property and franchises, rights and privileges now held by the Maine Water Company within said District, and said towns of Benton and Winslow, including all lands, waters, water rights, dams, reservoirs, pipes, machinery, fixtures, hydrants, tools, and all apparatus and appliances owned by said company and used in supplying water in said District and towns and any other real estate in said District.

Sec. 7. In case said trustees fail to agree with said Maine Water Company upon the terms of purchase of the above mentioned property on or before April 15, 1899, said Water District, through its trustees, is hereby authorized to procure judicial appraisal and condemnation of said property by bill in equity filed in the Supreme Judicial court for the county of Kennebec for that purpose on or before May one, eighteen hundred and ninety-nine, and jurisdiction is hereby given to said court over the entire matter, including application of the purchase money, discharge of incumbrances and transfer of the property. For the purpose of fixing the valuation thereof it shall appoint three appraisers, one of whom shall be learned in the law and another skilled in hydraulic engineering, none of whom shall be residents of the counties of Kennebec or Somerset, and on payment or tender by said District of the

amount fixed, and the performance of all other terms and conditions imposed by the court, said entire plant, property, franchises, rights and privileges shall become vested in said Water District, and be free from all liens, mortgages and incumbrances theretofore created by the Waterville Water Company, or the Maine Water Company. Said appraisers shall, upon hearing, fix the valuation of said plant, property and franchises at what they are fairly and equitably worth, so that said Maine Water Company shall receive just compensation for all the same. In their report said appraisers shall state the date as of which the valuation aforesaid was fixed, from which date interest on said award shall run, and all net rents and profits accruing thereafter shall belong to the Water District. The court may confirm such report, or reject it, or recommit the same, or submit the subject matter thereof to a new board of appraisers.

Sec. 8. Before a commission is issued to the appraisers, either party may ask for instructions to the appraisers and all questions of law arising upon said requests for instructions or upon any other matters in issue may be reported to the law court for determination before the appraisers proceed to fix the valuation of the property. All proceedings of the court or any judge with reference to any matter herein, raising a question of law, shall be subject to exceptions in the manner provided by statute in equity causes; but after decision of the law court upon report as provided for in the first part of this section, notwithstanding said exceptions, the case shall proceed before a single justice and shall not again be marked 'law' until after decree thereon, unless the court or the judge being of the opinion that any question involved is of sufficient importance shall otherwise order. After said appraisers begin the work of the valuation of said plant and property, said bill in equity shall not be discontinued or withdrawn by said Water District and the said Maine Water Company after that date may on its part cause said valuation to be made as herein provided and shall be entitled to appropriate process to compel said Water District to perform the terms of the final decree and to pay for said plant and property in accordance therewith.

Sec. 9. All valid contracts now existing between the Waterville Water Company or the Maine Water Company and any persons or corporations for supplying water within said District and said towns of Benton and Winslow shall be assumed and carried out by said Kennebec Water District.

Sec. 10. For accomplishing the purposes of this act said Water District through its trustees is authorized to issue its bonds to an amount sufficient to procure funds to pay expenses incurred in acquisition of the property of said Maine Water Company and the purchase thereof and to secure a new source of supply. Said bonds shall be a legal obligation of said Water District, which is hereby declared to be a quasi municipal corporation within the meaning of section fifty-five, chapter forty-six of the Revised Statutes, and all the provisions of said section shall be applicable thereto.

Sec. 11. All individuals, firms and corporations, whether private, public or municipal, shall pay to the treasurer of said District the rates established by said board of trustees for all water used by them, and said rates shall be uniform in their application within the District. Said rates shall be so established as to provide revenue for the following purposes:

I. To pay the current running expenses for maintaining the water system and provide for such extensions and renewals as may become necessary.

II. To provide for payment of interest on the indebtedness of the District.

III. To provide each year a sum equal to not less than one, nor more than three per cent. of the entire indebtedness of the District, which sum shall be turned into a sinking fund to provide for the final extinguishment of the funded debt. The money set aside for the sinking fund shall be devoted to retirement of the District's obligations or invested in such securities as savings banks are allowed to hold.

IV. If any surplus remain at the end of the year it shall be divided between the municipalities composing the District in the same proportions as each contributed to the gross earnings of the District's water system, and in order that these proportions may be readily determined, all money received for

water in each of said municipalities shall be entered in separate accounts so that the total amount thereof can be easily ascertained.

Sec. 12. The property of said District shall be exempt from taxation.

Sec. 13. All incidental powers, rights and privileges necessary to the accomplishment of the main object herein set forth are granted to the corporation hereby created.

Sec. 14. This act shall take effect whenever approved by majority votes of the City of Waterville and the Fairfield Village Corporation at legal meetings called under the provisions of the charters of said places. This act shall take effect when approved by the governor so far as necessary to empower the calling of said meetings.

Sec. 15. Sections two, three and four of this act shall be inoperative, null and void, unless the said Water District shall first acquire by purchase, or by exercise of the right of eminent domain as in this act provided, the plant, property, franchises, rights and privileges now held by the Maine Water Company within said District and said towns of Benton and Winslow.

Sec. 16. All costs and expenses arising under the provisions of this act shall be paid as directed by the court.

(Approved March 17, 1899.)

AMENDMENTS OF 1905

STATE OF MAINE.

In the Year of our Lord One Thousand Nine Hundred and Five.

An act to amend an act incorporating the Kennebec Water District.

Be it enacted by the Senate and House of Representatives in Legislature assembled as follows:—

Section 1. Section one of chapter two hundred of the private and special laws of eighteen hundred and ninety-nine is hereby amended by striking out the word "and" between the words "Benton and Winslow" in the fifth line thereof and inserting the words 'and Vassalboro' after said word "Winslow," so that said section as amended, shall read as follows:

'Section 1. The territory and people constituting the city of Waterville and the Fairfield Village Corporation shall constitute a body politic and corporate under the name of the Kennebec Water District for the purpose of supplying the inhabitants of said District and of the towns of Benton, Winslow and Vassalboro and all said municipalities with pure water for domestic and municipal purposes.'

Section 2. Section four of said chapter is hereby amended by striking out the word "and" between the words "Benton and Winslow" in the third line thereof and inserting the words 'and Vassalboro' after the said word "Winslow," so that said section as amended, shall read as follows:

'Section 4. Said District is hereby authorized to lay in and through the streets and highways thereof and of said towns of Benton, Winslow and Vassalboro, and to take up, repair and replace all such pipes, aqueducts and fixtures as may be necessary for the objects above set forth, and whenever said district shall lay any pipes or aqueducts in any street or highway, it shall cause the same to be done with as little obstruction as possible to public travel, and shall at its own expense without unnecessary delay cause the earth and pavement removed by it to be replaced in proper condition.'

Section 3. Section ten of said chapter is hereby amended by striking out the first sentence and inserting the following instead thereof:

'The trustees of the District may, for the purpose of paying any necessary expenses and liabilities incurred under the provisions of this act, including the expenses incurred in acquiring the property of the Maine Water Company by purchase or otherwise, in securing sources of supply, taking water and land, paying damages, laying pipes, constructing, maintaining and operating a water plant, and making renewals, extensions, additions and improvements to the same, issue from time to time bonds of the District to an amount necessary in the judgment of the trustees therefor.'

Said section ten is further amended by changing the reference to the revised statutes so as to conform to the revision of nineteen hundred and three, so that said section as amended, shall read as follows:

'Section 10. The trustees of the District may, for the purpose of paying any necessary expenses and liabilities incurred under the provisions of this act including the expenses incurred in acquiring the property of the Maine Water Company by purchase or otherwise, in securing sources of supply, taking water and land, paying damages, laying pipes, constructing, maintaining and operating a water plant, and making renewals, extensions, additions and improvements to the same, issue from time to time bonds of the District to an amount necessary in the judgment of the trustees therefor. Said bonds shall be a legal obligation of said water District,

which is hereby declared to be a quasi municipal corporation within the meaning of section ninety-six, chapter forty-seven of the revised statutes, and all the provisions of said section shall be applicable thereto.'

Section 4. Said District is hereby authorized to refund its indebtedness from time to time in whole or in part as may seem best to the trustees and to borrow money temporarily for any of the legitimate purposes of the District.

Section 5. Whenever said District shall take land or easements therein for its use it may mark the lines and boundaries thereof by suitable monuments.

Section 6. Proceedings for condemnation by said District shall be commenced by filing in the office of the county commissioners of the county where the property is situated a certificate of taking accompanied by plans and descriptions of said property together with the names of the party or parties supposed to be owners thereof and proceedings shall then be had for the appraisal of damages as in the case of laying out highways by the county commissioners.

Section 7. The procedure herein provided for may apply in case of land already taken by said District provided it proceeds in accordance herewith on or before June first, nineteen hundred and five.

Section 8. In case of any crossing of a railroad unless consent is given by the company owning or operating such railroad as to place, manner and conditions of the crossing, the railroad commissioners shall determine the place, manner and conditions of such crossing; and all work within the limits of such railroad location shall be done under the supervision and to the satisfaction of the officers of such railroad company but at the expense of the District.

Section 9. This act shall take effect when approved.

(Approved March 8, 1905.)

ENGINEER'S REPORT

Boston, Mass., February 22, 1906.

To Dr. Frederick C. Thayer,
Mr. Virgil R. Connor,
Mr. Ira E. Getchell,
Mr. Stephen A. Nye,
Mr. Walter S. Wyman,
Trustees of the Kennebec Water District.

Waterville, Maine.

Gentlemen:—

In response to your request I submit herewith my report upon the reconstruction, during the years 1904 and 1905, of the water works supplying the Kennebec Water District, and the towns of Benton and Winslow.

In making this report I have attempted, without going into too great detail, to touch upon the essential facts relating to this construction work, which should be a matter of permanent record and which seemed likely to be of particular interest to the public. In doing this I have discussed successively the following General Topics:—

Works taken from the Maine Water Company.
Quality of the Messalonskee stream water.
New sources considered.
New supply from China lake.
China lake pipe line (including data relating to population and water consumption of the District, and other fundamental considerations.)
Improvements at the pumping stations on Messalonskee stream, and introduction of auxiliary steam pumping plant.

Reinforcement and extension of the pipe distribution system.
General items relating to contract prices and cost of work.
Appendixes.

WORKS TAKEN FROM THE MAINE WATER COMPANY

The works taken from the Maine Water Company, at least so far as the physical plant is concerned, comprised roughly:

(1). **A water supply** drawn from Messalonskee stream at Crommett's mill, which is about 2.4 miles above its confluence with the Kennebec river, and 7.1 miles below the outlet of Snow pond or Messalonskee lake in the town of Oakland.

(2). **Two pumping stations** located upon opposite banks of Messalonskee stream, adjacent to Western avenue, with two water power privileges and timber crib dams at this point. The upper privilege, comprising the Arnold & Furbish and H. H. Ellis properties, developed a head of approximately 14 feet, and the lower privilege, known as the John W. Butterfield privilege, in which the company had but a half interest, developed a head of approximately 8 feet. Pumping station No. 1, on the westerly bank of the river, contained a geared power pump (14½x18 inches) built by the Deane Steam Pump Company of Holyoke, rated at 1,500,000 to 1,750,000 gallons daily capacity, driven by a 51-inch Hercules wheel operating under a 14-foot head of water. Pumping station No. 2, on the easterly bank, contained a geared power pump (16x24 inches) built by the Knowles Steam Pump Works, rated at 2,500,000 gallons daily capacity, driven by a 48-inch Victor wheel operating under the same head.

(3). **A reservoir** (with earthen embankment) located on the hillside about 7,280 feet westerly from College avenue, midway between Waterville and Fairfield, with a depth of 13 feet and a capacity of 2,250,000 gallons. The high water

line in the reservoir is approximately at grade 288.5, and the pumping station at substantially the same level as the city hall park in Waterville, approximately grade 75 (referred to city datum; add 23.1 feet to refer grades to U. S. Geological Survey datum as corrected in 1905).

(4). **The distribution system,** which comprised the following general schedule of pipes, gates and hydrants:

TABLE 1

Distribution System Taken From the Maine Water Co.

	Waterville.	Fairfield.	Benton.	Winslow.	Totals.
Cast Iron Pipe.	Ft.	Ft.	Ft.	Ft.	Ft.
16-inch	237				237
14-inch	7,280				7,280
12-inch	11,097				11,097
10-inch	9,711	1,721			11,432
8-inch	7,915	4,872		1,634	14,421
6-inch	35,934	14,668		928	51,530
4-inch	3,003				3,003
Total, Cast Iron Pipe	75,177	21,261		2,562	99,000
Wrought Iron Pipe.					
8-inch		927	1,230	1,189	3,346
2-inch	35,866	11,378	3,642	2,873	53,759
1 1-2-inch	1,293			285	1,576
1-inch	6,292	3,723	550		10,565
3-4-inch	485	293			788
Total, Wrought Iron Pipe	43,934	16,321	5,422	4,347	70,024
Grand Total, Cast Iron and Wrought Iron Pipe	118,111	37,582	5,422	6,909	169,024
Hydrants	72*	29	1	3	104
Valves, etc.					
14-in. gate valves and boxes					2
12-in. gate valves and boxes					15
10-in. gate valves and boxes					12
8-in. gate valves and boxes					19
6-in. gate valves and boxes					101
4-in. gate valves and boxes					8
3-in. gate valves and boxes					1
2-in. gate valves and boxes					112
1 1-2-in. gate valves and boxes					5
1-in. gate valves and boxes					9
16-in. check valve					1
12-in. check valve					1
8-in. check valve					1
6-in. check valve					1
1-in. Newports with Jarecki boxes					10
3-4-in. Newports with Jarecki boxes					1
3-4-in. air cocks with valves and boxes					4

* Including 2 pumping station hydrants.

The distribution system included, in addition to the pipes laid across the bridges over the Messalonskee stream on Western avenue and over the Kennebec river between Fairfield and Benton, three submerged river crossings:—one 480 feet in length, of 8-inch pipe, across the Kennebec river from Waterville to Winslow; one 220 feet in length, of 8-inch pipe, across the Hollingsworth & Whitney canal in Winslow; and one 150 feet in length, of 6-inch pipe, across the west channel of the Kennebec river at Fairfield.

The number of services or connections with the mains is shown in Table 2.

TABLE 2

Number of Services at the End of Each Year

	1900.	1901.	1902.	1903.	1904.	1905.
Waterville	1,284	1,343	1,386	1,431	1,500	1,573
Winslow	39	44	45	56	60	91
Fairfield	421	414	396	378	391	427
Benton	44	46	46	50	54	55
No. Vassalboro						12
Total	1,788	1,847	1,873	1,915	2,005	2,158

The number of buildings in the District was determined by Mr. H. E. Green, in connection with the valuation case in 1903, with the following result:

Waterville	1,813 buildings
Fairfield	580
Benton	85
Winslow	287
	2,765

These figures were further subdivided into the following groups:

Houses	2,234
Stores	161
Churches	16
Schoolhouses	20
Other buildings	334
	2,765

The number of buildings within the District reached by the pipe system was estimated in 1905 to be as follows:

Houses	2,265
Stores, churches and schools	205
Sundry barns, sheds, etc.	335
	2,805

QUALITY OF THE MESSALONSKEE STREAM WATER

Chemical and bacteriological analyses of the water in Messalonskee lake (Snow pond) made by Mr. George C. Whipple in 1903, showed the water to be excellent in character, but unfortunately owing to the topography and the location of a number of mills and houses upon the banks of the Messalonskee stream in the town of Oakland, between the lake and the pumping station, the river was polluted by the entrance of sewage and more or less manufacturing waste. Typhoid fever had been epidemic in the Kennebec Water District several times in bygone years, and the typhoid statistics were not creditable to the community. This naturally threw suspicion on the quality of the water supply. To be sure water had been drawn at times, for one reason or another, for brief periods, from the Kennebec river which was known to be polluted with sewage, but the Messalonskee stream itself, which ordinarily furnished the supply, was known to be polluted also.

The dangerous character of the Messalonskee water was clearly developed, in the valuation case, by the exhaustive and admirable investigation by Mr. George C. Whipple of the typhoid epidemic of 1902-1903,* which established beyond reasonable doubt, the fact that the typhoid epidemic was caused by infection of the Messalonskee stream by dejecta from typhoid patients at one of two points upon the stream a comparatively short distance above the pumping station intake. Moreover, chemical and bacteriological examinations indicated sewage pollution, and it was therefore apparent that improvement in the character of the water supplied to the community was essential. The fact that the water supply was not safe for drinking purposes was also clearly indicated in a popular way by the large amount of spring water consumed in this community. The amount paid for spring water was over $7,000 per year. This represented a heavy and unnecessary tax or burden upon the community. This sum might have been largely, if not wholly, saved to the community had the water supplied to it been of a suitable character. This fact is substantiated by the very large decrease in the sale of spring water since the introduction of the China lake supply.

NEW SOURCES CONSIDERED

Investigations were therefore made of the available sources of water supply;—the filtration of the Messalonskee stream, and the introduction of a supply from new sources,—Messalonskee lake (popularly known as Snow pond), China lake, and Pattee's pond. It is perhaps unnecessary at this time to go into a discussion of the considerations which led finally to the virtual abandonment of the Messalonskee stream and the adoption of China lake as the new source of supply.

* For an interesting account of this investigation see article by George C. Whipple and Ernest C. Levy published in the Journal of the New England Water Works Association, June 1905, pp. 163-212.

NEW SUPPLY FROM CHINA LAKE

China lake is situated about 8 miles southeasterly from Waterville in the towns of Vassalboro and China. Its outlet stream flows northerly from East Vassalboro, at the westerly end of the lake, through North Vassalboro, and discharges into the Sebasticook river at a point about 1 mile above its confluence with the Kennebec river in Winslow, Maine. As nearly as could be determined from the available maps, the area of the China lake watershed, including the lake itself, is approximately 40 square miles (the writer's estimate being 39.6 and that of Mr. George C. Whipple 36.8 square miles) while the water surface covers an area of approximately 6¼ square miles. The area of the China lake watershed is so large that its run-off is greatly in excess of the needs of the District, and it is unnecessary to go into an exhaustive study of the probable total yield of the watershed. It may be stated, however, that by comparison with the records of the well-known Cobbosseecontee river watershed above Gardiner, which have been carefully kept for some years, it is estimated that the mean daily yield from the China lake watershed would be upwards of 36,000,000 gallons, whereas the present mean daily consumption of water by the District is approximately 2,000,000 gallons, or about 1-18 of the total yield; and the estimated consumption at the end of the next 30 years is about 1-12 of the total yield. It is also worthy of note that the storage facilities in China lake are exceptionally good, the water surface amounting to about 16 per cent. of the area of watershed as against 8¾ per cent. in the case of the Cobbosseecontee above Gardiner. It may be stated further that with the China lake water surface amounting approximately to 6¼ square miles, the total annual consumption of the District at the present time would amount to less than 6 inches in depth of water over the lake surface (each 100,000,000 gallons of water corresponding to slightly less than 1 inch in depth over the lake.)

The lake is almost ideal for water supply purposes, having bold and rocky shores sloping rapidly into the lake, with very

little growth upon the margins and substantially no swamp lands, save a very limited area at the southerly end of the lake. The population upon the watershed is very small and the probability of pollution of the water is remote. The water is soft, clear and substantially colorless, and the bacterial content extremely low (approximately 50 per cubic centimeter.) The general character of the water is indicated by the average of four analyses of China lake water made by Mr. George C. Whipple in April, May and August 1903, stated in **parts per million:**

Turbidity by silica standard	2.
Color, platinum standard	13.
Odor, faintly vegetable.	
Albuminoid Ammonia in solution	.085
Albuminoid Ammonia in suspension	.006
Albuminoid Ammonia total	.091
Free Ammonia	.019
Nitrites	.000
Nitrates	.00
Total solids	35.2
Chlorine	1.5
Total hardness	22.6
Alkalinity, temporary hardness	15.2
Permanent hardness	7.4
Iron	.05
Total microscopic organisms per c. c.	245.
Amorphous matter	61.

China lake lies at an elevation of about 95 feet above the city square and the pumping stations in Waterville; the crest and sill of the dam at the outlet of the lake being respectively at elevation 171.6 and 165.8*, and the summit of the 24-inch pipe line in the gate house at elevation 163, as referred to the City Bench. The bottom of the reservoir between Waterville and Fairfield is about 200 feet above the city square, be-

*To convert given elevation to the old U. S. Geological survey datum add 25.1 feet; to new U. S. Geological Survey datum of 1904 add 23.1 feet.

ing at elevation 275, with the overflow at elevation 288.5. It is evident, therefore, that it would be impossible to supply the city by gravity from China lake, with water under sufficient pressure for fire protection.

A careful study of the most economical and satisfactory method of delivering the water from China lake into the water works reservoir, indicated the desirability of bringing the water by gravity from the lake to the pumping stations, from which it could be pumped by the existing pumping plant into the distribution mains, leading to the reservoir and the several towns supplied. This was the plan adopted.

CHINA LAKE PIPE LINE

A careful study of the contour maps and a reconnoissance of the territory lying between Waterville and China lake indicated the possibility of obtaining a gravity line from the lake to the existing pumping stations of the water company. Obviously one possible route lay along the line of the Outlet stream from China lake to a point near the Sebasticook river, and thence through the town of Winslow and under the Kennebec river to Waterville and the pumping stations located upon the Messalonskee stream. This line offered great difficulties in construction, however, on account of the hillside work and ledge to be encountered, as well as the long distance to be traversed. Further surveys developed the fact that the divide lying between the Kennebec river and the Outlet stream, running in a general northerly direction, could be crossed at one point by a pipe line without excessive cut, thus giving a shorter and more advantageous route to the pumping station. Various lines along different portions of this route were studied thereafter, and resulted in the final location, a description of which follows.

Soundings were made in China lake covering the portion near the Outlet stream and for a distance of from ½ to ¾ of a mile along the shore in both directions. From these

soundings and from an inspection of the character of the material on the bottom of the lake, the intake was located at the promontory on the Cates farm about ¼ mile easterly from the Outlet stream, running out into the lake in a southerly direction about 560 feet. The intake, which is surrounded with a masonry pavement, is located at a depth of 16.6 feet (to the invert of the 24-inch pipe, measuring from water level at elevation 171.6 corresponding to the crest of the dam). From this point, the pipe runs through the Cates farm; under Seaward's mill pond and the Outlet stream; thence along the highway or East Vassalboro road to the angle in the highway opposite Davis' mill; then enters the fields and runs along the banks of the Outlet stream to a point in North Vassalboro near the residence of Miss Celia Hickey, where it again enters the highway; thence along the North Vassalboro road towards Waterville to a point near the Baptist church; through the fields and along the margins of the Outlet stream to a point just above Shoddy Hollow, where it turns and crosses the Outlet stream mill pond; thence in a generally northwesterly direction crossing the narrow gauge Wiscasset, Waterville & Farmington Railroad tracks and the divide lying between the Outlet stream and the Kennebec river just north of Cook's hill, and along the brook lying to the west of the narrow gauge railroad to the northerly end of the Charles Cates property; crosses the summit of the tableland owned by Messrs. James H. and Samuel Chaffee, passes between the houses of Mr. George A. Chamberlain and Mr. J. P. Garland, and runs down the slope under the tracks of the Maine Central Railroad and to the Kennebec river; under the Kennebec river, up and over the sandy ridge owned by Mr. Fred Pooler, about ½ mile north of the confluence of the Messalonskee and Kennebec rivers and about the same distance south of the cemetery; under the Messalonskee stream; northerly through the fields to the highway, at a point westerly from the power plant of the Union Gas & Electric Company; thence northerly along the highway to the intersection of Oakland road, at which point it again enters private property and runs along the westerly bank of the Messalonskee stream in a substan-

tially straight line, leading under the Messalonskee stream again and along the easterly side of Chase's mill to the pumping station. The total length of this line is approximately 44,500 feet or about 8½ miles.

Pipe Line "Right of Way" or "Taking." The surveys were all made by transit instrument, and the distances were measured to the nearest hundredth of a foot by steel tape. The recorded bearings are true bearings, and the line was computed by the method known to engineers as that of "latitudes and departures." Easement has been taken in the properties traversed by the line, but the land contiguous to the intake has been taken in fee in order to maintain the purity of the supply and to prevent the lowering of the lake outlet. The line of the "taking" which was filed with the County Commissioners of Kennebec county on June 1, 1905, embodies the following "Explanation of 'Description of Line' and Width of Taking," relating to the "right of way."

"The rights and easements referred to above are taken in a strip of land the right side or boundary of which is described in the following 'Description of Line,' beginning at a point on Pearson's tannery road near the pumping station of the Kennebec Water District in the City of Waterville, Kennebec county, Maine, and running southerly through the towns of Winslow and Vassalboro to the shore of China lake.

"The width of the strip of land referred to, which strip lies wholly to the left of the line described below, is two (2) rods, from the point of beginning up to the middle of the last described crossing of Outlet stream (between bounds marked K. W. D. No. 102 and K. W. D. No. 103 and the properties supposed to belong to George Buzzell and O. T. Goddard, respectively), and three (3) rods from this point for the remainder of the distance to China lake.

"All bearings are referred to the true north line as determined by an observation upon Polaris at its eastern elongation taken on the evening of June 23, 1904, at a point near the survey line run to China lake, and about one-half of a mile south of the Kennebec Water District pumping station."

Bounds or Monuments. The location of the line referred

to in the "taking" is clearly shown by concrete bounds located along the line at all property lines and angles. These bounds were built upon the ground in post holes 5 feet or more in depth and in forms, either flush with the ground, in mowing fields and grass lands, or about 1 foot above the surface of the ground, along fence or property lines. The bounds were of the following general form;—below the ground eight inches in diameter, 5 feet in depth, with the base flared out to from 4 to 6 inches greater diameter; above the surface of the ground, or at the top of the post, 6 inches square for a length of 6 or 16 inches according as the bounds were built flush with or above the surface; in the four corners of the square top and extending to the bottom of the post were bedded bars of ¼-inch steel bent in U form across the top of the post. In the top of the post was bedded a small iron casting with expanded bottom bearing the letters K. W. D. and the number of the bound, as for instance: K. W. D. 95. The concrete of which these bounds were made was mixed on the ground in the proportion of one part of Portland cement to two parts of sand to four parts of gravel or broken stone of approximately ½-inch diameter. The cost of these bounds erected was considerably less than it would have been for granite bounds, and it is believed that they will prove even more satisfactory, since it seems probable that there will be less danger of heaving by frost; time alone, however, can determine whether this is the fact.

The total cost of the bounds in final position averaged about $4.30 each, including therein the cost of all materials, supplies and forms, and all teaming, labor and supervision.

COST OF MONUMENTS

	No. Built.	Cost per month.	Average.
September	52	$211.85	$4.07
October	36	160.25	4.45
November	15	65.25	4.35
Total	103	$437.35	$4.25

This includes $1.00 per day for 48 days for District horse, but does not include cost of forms, which amounted to between $4.00 and $5.00 making the total average cost per bound (in place) $4.30.

Considerations Affecting Diameter of China Lake Pipe Line. In addition to the possible alignment of the pipe line (that is the plan and profile of the line) the population and water consumption of the District, both past and future, were involved in a consideration of the necessary capacity to be provided.

Population of the District. The combined population of the District as determined by the United States census is shown in the following table:

TABLE 3

Population, Kennebec Water District

Date.	Waterville.	Fairfield.	Winslow.	Benton.	Total.
1850	3,964	2,482	1,796	1,189	9,431
1860	4,392	2,753	1,739	1,183	10,067
1870	4,852	2,999	1,437	1,180	10,468
1880	4,672	3,044	1,467	1,173	10,356
1890	7,107	3,510	1,814	1,136	13,567
1900	9,477	3,878	2,277	1,097	16,729

The population of the Kennebec Water District in 1904, and the future populations in the years 1924, 1929 and 1934,

were estimated at 18,000 and at 24,400, 26,000 and 27,600 respectively.

In this connection Table 4, prepared by Harvey D. Eaton, Esq., is interesting as showing the development of the territory served by the Kennebec Water District.

TABLE 4

Table Showing the Development of the Territory Served By the Kennebec Water District

Year.	Waterville.			Fairfield Village.			Benton.			Winslow.			Totals.		
	Polls.	Pop.	Valuation.	Polls.	Pop.	Valuation.	Polls.	Pop.	Valuation.	Polls.	Pop.	Valuation.	Polls.	Pop.	Valuation.
1880	923	4,672	$2,175,880	424	1,660	$521,320	271	1,173	$330,987	316	1,467	$412,640	1,934	8,972	$3,440,827
1890	1,785	7,107	3,910,101	569	2,130	715,060	268	1,136	396,543	374	1,814	552,090	2,996	12,187	5,573,794
1891	1,894	.....	4,468,647	555	.....	744,042	265	.....	394,452	383	.....	551,715	3,097	.....	6,148,856
1892	2,014	.....	4,575,678	540	.....	728,316	257	.....	388,840	393	.....	631,335	3,204	.....	6,324,178
1893	2,214	.....	4,645,347	539	.....	719,780	275	.....	392,374	253	.....	1,129,495	3,281	.....	6,886,996
1894	2,418	.....	4,687,250	549	.....	690,878	270	.....	385,902	443	.....	1,152,365	3,680	.....	6,916,395
1895	2,749	.....	4,712,390	581	.....	755,622	266	.....	382,912	449	.....	1,161,460	4,045	.....	7,012,384
1896	2,304	.....	4,710,774	*	.....	*	306	.....	384,409	472	.....	1,162,585	.....	.....	.....
1897	2,317	.....	4,846,020	*	.....	*	279	.....	380,468	465	.....	1,162,360	.....	.....	.....
1898	2,351	.....	4,912,865	556	.....	743,494	289	.....	392,771	478	.....	1,206,655	3,674	.....	7,255,785
1899	2,284	.....	4,902,767	592	.....	730,096	294	.....	386,870	533	.....	1,250,820	3,703	.....	7,270,553
1900	2,374	9,477	4,961,812	555	2,238	766,005	306	1,097	393,359	534	2,277	1,917,040	3,769	15,089	8,038,256
1901	2,486	.....	5,083,332	571	.....	773,819	327	.....	398,586	525	.....	2,090,260	3,909	.....	8,345,997
1902	2,618	.....	5,219,183	595	.....	820,280	318	.....	409,263	583	.....	2,105,405	4,114	.....	8,554,111
1903	2,712	.....	5,290,480	608	.....	904,130	313	.....	419,993	579	.....	2,116,692	4,212	.....	8,731,295
1904	2,808	.....	5,353,750	618	.....	939,370	324	.....	428,096	558	.....	2,044,430	4,308	.....	8,765,646

* Records missing. Population Fairfield Village only taken (with town not given here.)

Water Consumption. The water consumption as determined from the pumping station record is shown in Table 5, together with the estimated population and the resulting estimated per capita consumption: to this is appended the estimated population of 1904, and of 1924, 1929 and 1934 (that is 20, 25 and 30 years hence) together with the estimated daily consumption of water.

TABLE 5

Consumption of Water in Kennebec Water District

Year.	U. S. Gallons Pumped.	U. S. Gallons Per Day.	Joint Population of Four Towns. Total.	Gallons Per Capita Daily.
1888	73,821,000	202,000	12,925	16
1889	109,031,000	299,000	13,246	23
1890	167,550,000	459,000	13,567	34
1891	191,850,000	526,000	13,883	38
1892	192,050,000	525,000	14,199	37
1893	296,500,000	812,000	14,515	56
1894	299,925,000	822,000	14,832	55
1895	398,945,000	1,093,000	15,148	72
1896	428,422,000	1,171,000	15,464	76
1897	508,662,000	1,393,000	15,780	88
1898	523,000,000	1,433,000	16,096	89
1899	613,399,000	1,680,000	16,413	102
1900	530,838,000	1,454,000	16,729	87
1901	538,970,000	1,477,000	17,045	87
1902	524,640,000	1,437,000	17,361	83
1903	607,564,000	1,665,000	17,677	94
1904	669,986,000	1,830,000	17,993	102
1905	755,351,000	2,070,000	18,309	113
1924*	.....	2,660,000*	24,400*	109*
1929*	.....	2,860,000*	26,000*	110*
1934*	.....	3,060,000*	27,600*	111*

* Estimated.

The pumping records were also carefully studied with a view to determining the maximum variations in daily, weekly and monthly quantity of water pumped, and the necessary excess capacity to meet the variations in daily draft, which would have to be provided in the pipe line, over the mean daily consumption, determined from the quantity of water pumped annually. From the available records in the decade from 1894 to 1903 the following results were obtained:

TABLE 6

Relation of Maximum Monthly Consumption to Average

Year.	Month of Max. Consumption.	Ratio of actual Max. monthly consumption to mean monthly consumption.
		Per Cent.
1894	February	127
1895	October	118
1896	June	143
1897	October	116
1898	July	117
1899	August	140
1900	August	113
1901	July	128
1902	December	120
1903	January	112

The records of the Massachusetts State Board of Health show the corresponding mean ratio of 137.5 per cent.

Similarly, during the same decade, the ratios of the maximum daily consumption, or the consumption for a continuous period of 5 or more days, in comparison with the mean daily consumption determined from the total annual consumption are shown in Table 7.

TABLE 7

Relation of Maximum Daily Consumption to Average

Year.	Mean daily consumption U. S. Gallons.	Ratio of Max. to mean daily consumption.	Ratio of Max. for period 5 days or more to mean daily consumption.	
		Per Cent.	Per Cent.	Days.
1894	822,000	195	171	5
1895	1,093,000	160	137	5
1896	1,171,000	192	173	6
1897	1,393,000	130	124	5
1898	1,433,000	140	134	5
1899	1,680,000	162	146	5
1900	1,454,000	137	130	5
1901	1,477,000	147	139	5
1902	1,437,000	138	133	6
1903	1,665,000	133	118	6

It will be noted therefore that the daily maximum has varied during this decade from 130 to 195 per cent. of the mean daily consumption, and that the maximum consumption for a continuous period of 5 days has varied from 118 to 173 per cent. of the mean. Moreover it was found that during the year 1896 there was one period of 13 days in which the consumption reached 155 per cent. of the mean consumption for the year.

TABLE 8

Maximum Ratio of Actual Consumption for Various Periods to Mean Consumption

Continuous Period.	Month (1896.)	Per Cent.
1 month	June	143
2 months	June and July	139
3 months	June, July and August	135
4 months	May, June, July and August	133
5 months	May to September inclusive	129
6 months	May to October inclusive	128

For comparison with these records it is perhaps interesting to note that the Massachusetts records show a mean value of the maximum daily consumption in different cities and towns of 231 per cent. of the mean daily consumption, and for the maximum weekly consumption, 163 per cent.

It was evident that no available storage in this vicinity could economically reduce the maximum draft below 150 per cent. of the average, or thereabouts. While the available storage in the present reservoir is very small, about 2,250,000 gallons, it was assumed that before the capacity of the pipe system was actually reached, additional storage capacity would undoubtedly be constructed for the District, and that water meters would probably be introduced, not only in order to cut down the waste, but as giving a more equitable basis for charging for water service.

Capacity of China Lake Pipe Line. Taking these facts and the contemplated improvements at the pumping stations

into consideration, it was assumed that the supply pipe should be designed with a daily capacity at least 50 per cent. in excess of the **mean** daily consumption of water (3,000,000 gallons per day) estimated for the Kennebec Water District for the year 1934, thirty years hence, or in other words a **pipe capacity of 4,500,000 gallons per day** delivered through pipe thirty years old **was assumed** to be necessary. As a result of final studies on the profile of the location determined, and with the available commercial sizes of pipe, the probable **actual capacity** of the most economical pipe line was **estimated as follows;—**

From low water in China Lake to zero pressure at the pumping station:

New: 6,075,000 gallons per 24 hours.

Old: 4,500,000 gallons per 24 hours.

From low water at China lake to 24 feet suction lift at the pumping station:

New: 6,880,000 gallons per 24 hours.

Old: 5,100,000 gallons per 24 hours.

or to put the case in a different way, the pipe line actually built is estimated to discharge with low water level in China lake:—

TABLE 9

Capacity of China Lake Pipe Line

New:

3,000,000	gallons	per	24	hours	under	a	pressure	of	28	pounds	per	square	inch
4,021,000	"	"	"	"	"	"	"	"	20	"	"	"	"
5,000,000	"	"	"	"	"	"	"	"	8	"	"	"	"
6,075,000	"	"	"	"	"	"	"	"	0	"	"	"	"
6,880,000	"	"	"	"	"	24 feet lift.							

25 to 30 years old:

3,000,000	gallons	per	24	hours	under	a	pressure	of	20	pounds	per	square	inch
4,000,000	"	"	"	"	"	"	"	"	8	"	"	"	"
4,500,000	"	"	"	"	"	"	"	"	0	"	"	"	"
5,100,000	"	"	"	"	"	24 feet lift.							

No anxiety need be felt as to the draft of water from China lake to such an extent as to endanger the Waterville supply. It will be noted that the above figures of discharging capacity of pipe are based upon low water level in China lake, which corresponds to the drawing down of the water in the lake to the sill of the outlet dam at elevation 165.8. It is very unlikely that the water will ever be drawn below this point, on account of the long narrow channel of approach from the lake to the dam, which has been taken by the District in order to protect itself against the contingency of having this channel excavated and the sill of the dam lowered so as to admit of drawing the lake surface down to a lower level. Under this condition of low water in China lake, the pipe line leading to the city will still have a depth of 2.8 feet of water over the top of it (or 4.8 feet over the pipe invert) at the China Lake intake gate house, which is the summit of the pipe line (and where the invert of the pipe is at elevation 161). Under conditions of high water corresponding to the level of the crest of the dam at Outlet stream, which is at elevation 171.6, the water will stand at a depth of 8.6 feet above the top of the pipe in the gate house. The end of the intake pipe in the lake is 6 feet below its summit in the gate house, and hence it is covered by 14.6 feet of water at high water and 8.8 feet at low water; these stages of the water correspond respectively to the crest and sill of the controlling dam upon the Outlet stream.

Length and Diameter of China Lake Pipe Line. The gravity line from China lake to the pumping stations is made up of cast iron pipe of the following sizes, beginning at the pumping station:

TABLE 10

Data on China Lake Pipe Line

Diameter.	Class, †	Length.	Remarks.
16-inch.....	Class C.....	80. +ft.....	From pumping station to sta. 1+12.
20-inch.....	Class C.....	23,388. ft.....	From sta. 1+12 to sta. 235.
24-inch.....	Class C.....	5,700. ft.....	From sta. 235 to sta. 292.
24-inch.....	Light weight	14,715. ft.....	From sta. 292 to sta. 439+15 gate-house.
24-inch.....	Class E.....	600. ft.....	From gate-house to intake at sta. 445+15

† N. E. W. W. Classification.

Exceptions should be made in the above statement of the pipe used in pond and river crossings, which was of the heavy class E pattern. Ball-and-socket, or flexible-joint pipe, of R. D. Wood & Company type, were used at every fourth joint in the Kennebec river crossing and at the outer end of the China lake intake, as well as at certain points in the stream and pond crossings.

Hydraulic Grade Line, China Lake Pipe Line. The hydraulic grade line of the China lake pipe line was finally established in accordance with the following table, it being found most advantageous to so locate the grade line as to admit of ultimately utilizing a suction lift of 24 feet at the pumps, instead of running the hydraulic grade line to the level of the suction valves or thereabouts. The pipe line was laid with all summits below this hydraulic grade line.

TABLE 11

Hydraulic Grade Line From China Lake

Pipe diameter. Inches.	Station.	Elevation above city.	Slope in feet per 1,000 ft.
20	3	50.138	3.58
20	235	133.194	
24	235	133.194	
24	439+15‡	168.000‡	1.46
24	445+15*	168.876*	1.46

‡ Summit at gate-house.
* Intake (theoretical.)

Contract for Cast Iron Pipe. In response to call for bids upon about 4,000 tons of cast iron pipe and specials, proposals were received on June 4, 1904, from R. D. Wood & Co., U. S. Cast Iron Pipe & Foundry Co., Charles Millar & Son Co., M. J. Drummond & Co., and Warren Foundry & Machine Co. The contract was subsequently awarded to the lowest bidder, R. D. Wood & Co., and accepted by them on June 13, 1904, at the prices shown in Appendix A.

The pipe ordered was to conform substantially to the requirements of the "Standard Specifications for Cast Iron Pipes and Special Castings" of the New England Water Works Association, though some slight latitude was allowed in the form of bells and spigots to conform to the patterns of this foundry.

Foundries at which Pipe was Cast. Owing to the failure of Messrs. R. D. Wood & Co. to begin casting pipe in accordance with the terms of the contract, it became necessary for the Trustees to insist upon their placing at other foundries their order for 750 tons of pipe for immediate delivery, which they did on Aug. 13, 1904. Subsequently, under date Sept. 14, 1904, the Trustees themselves placed order with the Warren Foundry & Machine Co. for 450 tons of pipe for immediate delivery. As a matter of fact Messrs. R. D. Wood & Co. purchased on account of the District contract more pipe from other foundries than cited above, the order, exclusive of specials, being filled by the following foundries:

By Messrs. R. D. Wood & Co. from their Camden Foundry	1,569.4 short tons
from their Florence Foundry	584.1 short tons
By Donaldson Iron Co. from their Emaus Foundry	854.2 short tons
By Warren Foundry & Machine Co. from Elizabethport Foundry	1,201.7 short tons
	4,209.4

Pipe Deliveries and Progress in Pipe Laying. As a matter of record the dates of schooner and rail shipments and arrivals of pipe are given in Table 12. The pipe shipped by water (see Appendixes B & C) was delivered on the wharf at

Wiscasset, Maine, and was accepted at that point by the Kennebec Water District and shipped by the narrow gage Wiscasset, Waterville & Farmington Railway to the most advantageous points along the China lake pipe line, where it was taken by the contractor, Mr. Loring N. Farnum.

All-rail shipments were made by Maine Central R. R. to Winslow, Waterville or Wiscasset, as was most convenient.

TABLE 12

Dates of Shipment, Arrival and Unloading of Pipe (1904)

(From R. D. Wood & Co., except as otherwise noted).

SHIPMENTS BY WATER.

Name of Schooner.	Sailed.	Arrived.	Unloading Began.	Unloading Completed.	Cargo (Tons).*	Total received to date (Tons).*
Daisy Farlin	Aug. 5..	Aug. 13..	Aug. 15..	Aug. 23..	597.5	597.5
Maine	Aug. 24..	Sept. 3..	Sept. 5..	Sept. 8..	261.4	858.9
John Paul	Aug. 25..	Sept. 8..	Sept. 9..	Sept. 19..	582.2	1,441.1
†Margaret M. Ford	Sept. 3..	Sept. 10..	Sept. 20..	Sept. 24..	473.7	1,914.8
Millville	Sept. 10..	Sept. 25..	Sept. 27..	Oct. 3..	436.7	2,351.5
Mary A. Hall	Sept. 21..	Oct. 4..	Oct. 4..	Oct. 14..	552.0	2,903.5
‡Ira B. Ellems	Oct. 6..	Oct. 17..	Oct. 18..	Oct. 22..	364.0	3,267.5
†Margaret B. Roper	Oct. 17..	Oct. 21..	Oct. 24..	Oct. 28..	361.6	3,629.1
Samuel B. Hubbard	Oct. 6..	Oct. 25..	Oct. 31..	Nov. 5..	493.6	4,122.7
					4,122.7	

SHIPMENTS BY RAIL.

Car.	No.	Shipment.	Arrived.	Weight (Tons).*
P. R. R.	64,105	Aug. 30	Sept. 10	15.4
N. C. R.	9,659	Sept. 22		11.1
P. R. R.	167,576	Oct. 11		1.2
P. R. R.	4,662	Oct. 18	Oct. 28	100.9
P. R. R.	170,885		to	
P. R. R.	8,346			
P. C. C. & St. L.	195			
P. C. C. & St. L.	5,901			
P. F. W. & C.	8,292		Nov. 3	
P. R. R.	15,859	Oct. 22		13.5
N. C. R.	9,565	Nov. 9		15.0
P. R. R.	166,031	Dec. 1		2.4
				159.5

* Tons of 2,000 lbs.

† From Warren Foundry & Machine Co., Elizabeth, N. J.

‡ Part of cargo from Warren Foundry & Machine Co.

Inspection at the Foundry. The inspection of the cast iron pipe and specials at the foundry was placed in the hands of Mr. William R. Conard, of Burlington, New Jersey, who inspected substantially all of the pipe and specials used during the years 1904 and 1905. In addition to this foundry inspection, all pipes and specials were inspected by the District's inspector as they were unloaded at the wharf at Wiscasset, or on the railroad sidings, and again on the pipe trench before being laid.

Valves and Hydrants. Bids for furnishing the valves and hydrants required by the work were called for under date of May 25, 1904; this call resulted in the following canvass, opened June 4, 1904:

In view of the fact that it was deemed advisable by the Trustees of the District to obtain additional legislation before undertaking the reinforcement and extension of the distribution pipe-system, as referred to elsewhere in this report, and of the uncertainty as to the number of additional hydrants which the Trustees might be requested to place in the several municipalities, it was thought best to reject all bids for hydrants until the following year, and to place order for the valves only, in accordance with the bids submitted.

Contract for the valves was awarded to the lowest bidder, The Rensselaer Manufacturing Company, which furnished under the terms of its contract all valves used during both years of construction, notwithstanding the fact that the price upon valves advanced somewhat in the year 1905, over the prices of 1904 upon which contract had been awarded. The number of valves actually purchased was somewhat in excess of the estimated quantity upon which bids were made.

Manholes, Air Valves, Blow Offs, Etc. Inspection manholes which could be used hereafter for access to the pipe for inspection, cleaning, or other purposes, were inserted in the China lake pipe line at intervals of about 1,000 feet. They were formed of 20-inch tees, pointing upwards, covered by a cast iron blind flange, or cover, bolted to the flanged tee. These inspection tees were also used at points where air valves were necessary, the ribbed cover being perforated for a 2-inch wrought iron pipe to which was attached a 2-inch gate valve with short nipple carrying an air valve of the ball float type. At four points upon the line, piezometer connections were made, for testing hereafter the friction losses in the pipe. These piezometer connections consisted of four ¾-inch corporation cocks, set on the quadrants of the pipe at 45 degrees from the vertical diameter, flush with the interior of the pipe and connected on the outside by a ¾-inch lead pipe, which can be connected with the piezometer gage. The number and location of these inspection tees, air valves, blow offs, 20-inch valves, reducers, and piezometer connections, are shown in Appendix E.

Venturi Meter. Contract was entered into with the Builders Iron Foundry of Providence, Rhode Island, for a 16-inch Venturi meter with manometer tube, by which the water delivered by the China lake pipe line could be accurately measured. This meter was inserted at a point near pumping station No. 2, by reducing the 20-inch pipe to a 16-inch pipe a short distance before its entry into the pumping station. The meter pressure pipes were brought into the station engine room, where the amount of water flowing can be measured at all times by the manometer tube. A recording gage can readily be installed later.

Soundings for Ledge. Hammer and drill soundings for ledge were made throughout the length of the proposed line at intervals of from 100 to 400 feet, and occasional test-pits were dug, with a view to reducing, as far as possible, the uncertainties in the character of the material to be estimated upon by the bidders.

Bids Upon China Lake Pipe Line, Contract 3. Careful specifications, (covering the advertisement, proposal, contract and specifications, and form of bond) entitled "New Supply from China Lake, Contract 3, for Laying 20-Inch and 24-Inch Cast Iron Pipe Line from China Lake to Pumping Station in Waterville, Maine, July 1904," were prepared, printed and bound for the use of prospective bidders.

Advertisements for bids were published in "Engineering News," "Engineering Record," "Kennebec Journal," "Waterville Sentinel" and "The Evening Mail" under date June 28th, 1904. These resulted in the bids opened on July 12, 1904, shown in Appendix F.

Award of Contract for China Lake Pipe Line Work. Immediately after receipt of bids, careful investigation was made of the standing, the equipment and the previous experience of the three lowest bidders. This inquiry was made with particular care, in view of the short time available for the construction work before the approach of winter, and the desire of the Trustees that the contract work might not have to be carried over into the next season. As a result of these investigations, contract was awarded to the third bidder, Mr.

Loring N. Farnum of Boston, under date July 22, 1904, and accepted by him; the required bond, in the sum of $25,000, for the faithful performance of the contract, was furnished by the U. S. Fidelity & Guaranty Company of Maryland, on July 27, 1904.

Contract was accepted with definite knowledge on the part of the contractor of the terms of the contract for cast iron pipe and of the condition in which matters relating to pipe deliveries stood at that time.

Sketch of Method of Handling Work. The contractor stated that he meant to have at least three gangs of men ready for work in the field about September first, and to employ between 300 and 400 men to execute the work, in order that it might be substantially completed within the month of November, although the contract did not require completion until December 15, 1904.

Little active work, however, beyond the making of preliminary arrangements, was conducted in the field until about August 28. At this time the first gang, consisting of approximately 65 men, began work upon the laying of the 24-inch pipe in the highway at North Vassalboro.

The second gang consisting of approximately 70 men began trenching for the 20-inch pipe line in the woods between the Winslow road and North Vassalboro about September 9, 1904.

The third gang of men was organized about Aug. 31, 1904, to take up the work upon the river crossings, and was made up of an excellent gang of about seven river drivers under the foremanship of James Swan of Lewiston, supplemented by the necessary complement of day laborers. Of the river and mill pond crossings there were seven as follows:

Messalonskee stream near Chase's mill	142 ft. approx.
Messalonskee stream near Union Gas & Electric Company's dam	177 ft. approx.
Kennebec river	800 ft. approx.
Outlet stream from China lake at Shoddy Hollow mill pond	245 ft. approx.
Outlet stream from China lake at bayou.....	112 ft. approx.

Outlet stream from Davis' mill pond ..... 67 ft. approx.
Outlet stream at Seaward's mill pond ..... 270 ft. approx.
(not including sundry brook crossings which were not classed, however, as river crossings). This gang began work upon the first Messalonskee stream crossing near the Chase mill. This crossing was made by means of sand bag coffer dams built alternately from one side and then from the other, to the center of the stream. No particular difficulty, beyond a somewhat troublesome bottom of boiling sand, was encountered. The southerly bank against which the stream impinges was revetted with a log cribwork to prevent its erosion. The second Messalonskee stream crossing was then made by similar methods, without noteworthy incident.

By this time work upon the dredging of a channel across Kennebec river had progressed far enough so that this gang was transferred to lay the pipe across it, and to revet the river banks with log cribbing, as described more fully elsewhere herein.

The other river or pond crossings were subsequently made by the regular gangs, or special gangs of selected men, the general method pursued being that of building a coffer dam of sheet piling, using in some cases ordinary 2-inch planking, and in other cases 4-inch tongued and grooved sheeting. More or less trouble was experienced in making the crossing through the Shoddy Hollow mill pond on account of the old sawdust and slabs found upon the bottom, refuse from the old saw mill which was located years ago at the upper end of the mill pond.

The China lake intake was laid by a special gang after the manner described hereafter in this report.

The trenching work was done with pick and shovel, without use of machinery, except upon the deep cut (varying from 10 feet to 18 feet in depth) lying between the Outlet stream near Seaward's mill and the China lake intake, upon which a Carson cableway was used; and except upon the Kennebec river crossing, where a dredge was used for excavating the trench in the river bed, in which the pipe was laid.

The rock drilling was done for the most part by steam

drills of which there were nine upon different parts of the work.

Labor Used. The total labor employed upon the work varied, but in spite of the fact that the contractor intended to employ a force of from 300 to 400 men upon this work, the actual number rarely exceeded 250 men. Difficulty was experienced in holding the men upon the work, although it is understood that the ordinary daily rate of wage was $1.75 for ten hours work. A few Italians were employed, but the labor might, for the most part, have been fairly classed as "itinerant." A part of the difficulty experienced in holding the labor was due to the fact that there was great demand for lumbermen in the woods, and many men who were brought to Waterville by the contractor for this work left it almost immediately to go into the woods.

Abandonment of Work By Contractor. While the work on this contract was handled in the main with intelligence and vigor, the failure on the part of the contractor to maintain full quota of labor and sufficient skilled superintendence at certain times, not only seriously hampered and delayed the work, but also involved serious expense to him as did his decision to postpone the deep cut rock work from the Outlet stream to the China lake intake, and upon the intake itself, until the winter season. It was agreed that the work upon the lake intake could be handled to better advantage with the ice sheet upon the lake, under the methods contemplated by the contractor, than with the water unfrozen, but the wisdom of postponing the deep rock cut work was seriously questioned, for while the freezing weather made the bracing of the banks somewhat easier and cheaper, it was believed that this saving would be more than offset by the loss in efficiency of the labor in cold weather; and such proved to be the case. Up to December 1, 1904, or thereabouts, the work had been carried on by the contractor without loss, but in the month of December material loss was sustained by him, and upon January 4, 1905, he notified the Trustees of the Kennebec Water District of his abandonment of the work.

Progress on China Lake Pipe Line Work up to January 4, 1905. The condition of the work on January 4, 1905, on which date the contractor abandoned his work, is shown by the estimate of work done by him up to that time, submitted as Appendix G. The estimated work remaining to be done, as determined from the original estimate of work to be done under Contract 3 for building the China lake pipe line, is shown in Appendix H.

Abandoned China Lake Pipe Line Contract Completed by Kennebec Water District. Immediately after the abandonment of the work by Mr. Farnum its conduct was assumed by the District and carried through to completion under the direction of its engineer corps, assisted by Mr. Farnum's former superintendent, Mr. George S. Hewins. Mr. Hewins continued to act in his old capacity, making arrangements for the employment of all labor and ordering all necessary supplies; the clerical work incident to the preparation and payment of the monthly payrolls was done by the contractor's bookkeeper, Mr. Charles S. Caswell, and time-keeper, Mr. William F. Martin; all acting in co-operation with, and under the direction of, the resident engineer. All disbursements were made through the treasurer of the Kennebec Water District on vouchers covering original bills, or statements, for which Mr. Hewins and the engineer were responsible.

The condition of the work, not to mention the desire of the Trustees to furnish to the residents of the District pure and wholesome water at the earliest possible moment, was such as to make it necessary to carry forward the work as rapidly as possible, in spite of the cold season and without waiting for the milder weather of spring. The necessity of making repairs upon the Kennebec river crossing pipe-line is touched upon elsewhere. The cableway and other machinery required for the deep cut work between the Outlet stream and the lake intake were already upon the ground, and rental was being paid upon them; the condition of the banks in the deep cut made it desirable to push the work, rather than to leave it until the spring and then to sheet the trench; and finally, the lake intake could be built to much better advan-

tage with facility for working about it upon the ice, than upon scows or platforms erected over the work when the lake was free from ice. Moreover, the danger of injury to any coffer dam or other device for executing this work upon the lake intake, in a lake of the size of China lake, except in winter, was not to be overlooked. Therefore the construction work was continued in spite of intensely cold weather, coupled with heavy snowstorms from time to time. Naturally, operating under these conditions, the expense of doing the work materially exceeded the cost which would probably have been involved had much of the work been done earlier in the season.

Final Estimate Upon China Lake Pipe Line Contract. The final estimate upon the work performed under contract 3, both by the contractor, Mr. Loring N. Farnum, and by the Kennebec Water District after his abandonment of his contract, is shown in Appendix I. A summarized statement of the claims of the Kennebec Water District against Mr. Farnum, resulting from his abandonment of the contract, is shown below in Table 14.

TABLE 14

Summarized Statement of Claims of Kennebec Water District Against Loring N. Farnum Under Contract 3, Dated July 22, 1904

Loring N. Farnum, Dr.,
To Kennebec Water District.

To bills contracted by him and paid by K. W. D.		$16,968.43
To bills contracted by K. W. D. and paid by it for labor and materials used in the completion of the contract	$37,713.30	
Ditto materials used in Kennebec river crossing repairs	596.25	
		38,309.55
To excess cost of engineering after Jan. 1, '05		2,358.31
		$57,636.29

CREDIT:

By balance due on account of Contract 3, (see Appendix I)	$26,158.74	
By sundry credits	231.18	
		26,389.92
Balance due Kennebec Water District		$31,246.37

Note: The above includes no allowance for liquidated damages provided for under Section 1, page 13 of the contract.

Kennebec River Crossing. An interesting account of the method of making the Kennebec river crossing with the 20-inch cast iron pipe will be found in an article entitled "Laying a Submerged Water Main at Waterville, Maine" published in "Engineering Record" of December 17, 1904, volume 50, No. 25, pages 722 to 723, which was prepared, it is believed, from data furnished by the contractor. It may be of interest

to briefly outline here the method used so successfully by the contractor for doing this work. A track, formed by two rows of piles, 18 feet apart and 10 feet on centers, was built across the river upon the line of the pipe; each row of piles was capped by a double set of 6x10-inch spruce timbers, 30 feet long, bolted to one another through the tops of the piles, and surmounted by an 8x12-inch spruce timber, 30 feet long, laid flat and breaking joints with the lower set of stringers. Upon this track ran large cast iron rollers carrying a platform, which supported a stiff-legged derrick and a Hayward orange peel dredge of one cubic yard capacity, operated by a 20-horse-power Rawson & Morrison steam hoisting engine. By means of this dredge a channel or trench from 3 to 5 feet deep was excavated in the bed of the river, it being the intention to have the pipe covered at all points by at least one foot of suitable material. As the earth was dredged from the trench, it was dumped on the down stream side of the trestle, and no particular difficulty was experienced in making the excavation, or in maintaining the trench until the pipe was laid in it, although in places the material was exceedingly hard and compact and contained bowlders of considerable size.

The pipe was laid in the excavated trench by joining two pipes upon a scow substantially at the water level, and by then suspending them above the water from round timbers placed across the track from rail to rail. Pipes were then added one by one to this suspended line, every fourth joint being made by a flexible or ball and socket joint, of the R. D. Wood & Company pattern, (similar to the Ward joint), and when a sufficient number of pipes had been so jointed, the line was gradually lowered into the trench by slackening the ropes securing the pipes to the cross timbers. The amount of deflection made possible by the flexible joints was approximately 10 degrees, though the contractor was limited, in instructions given him, to a deflection of approximately 8 degrees. Unfortunately at one or two points sufficient care was not exercised by him to keep the deflection within the limits set, and in consequence the flexible-joint bells were

cracked at two places, the cracks occurring on the quadrants of the pipe along the vertical and horizontal diameters.

Ledge was encountered on the easterly end of the river crossing, which necessitated making a timber coffer dam. This was pumped out so that the rock could be drilled, blasted and easily excavated, after which the coffer dam was withdrawn and the pipe laying continued in the same manner as before.

The pile driving and timber work involved in the construction of the tracks across the river was begun on Aug. 15, and finished, with an intermission of about two and a half weeks in the interval, on October 1, 1904. The dredging was begun on September 19 and completed on October 7. The pipe laying followed the dredging closely, being begun on September 22 and completed on October 8.

Test of Kennebec River Pipe Crossing. Owing to delays and procrastination on the part of the contractor the pipe line was not tested until November 21, 1904, at which time water was introduced into the 20-inch pipe line through a 2-inch wrought iron pipe laid from the hydrant at the corner of Silver and Grove streets and tapped into the 20-inch main at Sidney road, and city pressure was introduced to the section of the line lying between the 20-inch gate near Captain Garland's house on the easterly side of the river and the plugged end of the pipe on Sidney road near Silver street bridge, about one mile west of the Kennebec river crossing. As the water was discharged from the city main on Silver street into the pipe line, watch was kept for its appearance on the easterly side of the Kennebec river near Captain Garland's house. There proved to be sufficient leakage in the line to waste the quantity of water which could be supplied through the 2-inch pipe from the city mains. A subsequent experiment of introducing colored water into the main at the air valve on top of the Pooler ridge, just west of the Kennebec river, developed the fact of a leak in the second flexible joint from the west bank of the Kennebec river, which was made apparent by the escape of the colored liquid from this joint, observed from a boat.

The diver then undertook to repair this joint, by excavating the sand around it and recalking the lead. Although this work did not stop the leak, it diminished it to such an extent that the water supplied by the 2-inch connection finally appeared in the blowoff at the top of the westerly bank of the river. Further examination of the pipe line, joint by joint, across the bed of the river, by the diver on November 28, 1904, developed the fact that, while the pipe appeared to be well supported by the deposit of silt in the trench under and around it, the bell of flexible joint No. 8 was badly cracked, though the neighboring joints, as indeed the rest of the joints in this crossing, appeared to be in good condition.

The nature of the break, as well as the experience in laying the pipe, indicated clearly that the break was due to lack of care in lowering the pipe into the trench at the two points at which injury was suffered. In spite of these facts the contractor disclaimed responsibility, on the technical ground of the use of the R. D. Wood & Company flexible joint, in place of the Ward joint which had been specified in the contract, although no objection was made on his part prior to the discovery of the injury. Although the contractor was instructed to make repairs at once, he failed to do so.

Repairs to Kennebec River Crossing Pipe Line. After the assumption by the District of the work of completing this contract, your engineer immediately made plans for repairing the pipe under the Kennebec river. While the difficulties may be imagined, with intensely cold weather, from 20 to 30 inches of ice capped with snow upon the river, and a swift current with anchor and needle ice running in the stream underneath this ice sheet, it appeared to be absolutely necessary to take up this work at once, while the ice sheet covered the river, for had repairs been delayed until the ice had disappeared, even greater difficulty would have been encountered in handling the work during the high water season in the spring, and subsequently during the summer when the logs were running. To have postponed the work until the driving season was over, and the river was in its dry stage, would have delayed repairs until the latter part of the following summer,

August or even September, and while this would have resulted in the saving of a few hundred dollars, it would have postponed the introduction of the pure China lake water, in substitution for the polluted Messalonskee water, until early in the fall of 1905. This seemed inexpedient from the point of view of the public health.

After careful study of the best method of repairing the cracked pipe it was concluded to utilize the general method successfully adopted some years ago in making the repairs upon the Bath, Maine, submerged harbor pipe line. It was impracticable to build coffer dams in the river in its condition at that time, and the work therefore had to be done by divers. A small house was erected upon a pontoon set upon the ice so as to prevent injury or loss of life in case the ice should break up unexpectedly. In this was placed a steam boiler and heating coil for the comfort of the divers, who were working at a time when the temperature fell to 10 degrees and 20 degrees below zero night after night, and when for days it did not get many degrees above the zero point, and an electric generator and system of electric lights was arranged by means of marine lamps so as to give the divers the necessary light to work on the bottom under the heavy ice sheet. It should perhaps be mentioned that it was found necessary to protect the divers against the force of the current and anchor ice by driving sheet piling around the periphery of the area excavated by them about the pipe being repaired. At intervals during the progress of the work, and for a few days after its completion, the hoisting engine was used for pulling the piles from the river bed.

A split sleeve, which could be bolted upon the outside of the cracked pipe by the divers, was designed in such a way as to admit of making the joint with a deflection in the pipe line not exceeding about 12 degrees. The split sleeve was about 4.4 feet long to outer ends of flanges, and weighed approximately 3,300 pounds. The divers first determined, by means of a rider straight edge device designed by the resident engineer, the amount of deflection in the pipe at the injured joints. With this information two pipes of similar diam-

eter were put together in the tool house of the company, the sleeve was bolted in place and the joints were run, after which the sleeve was removed and the lead gaskets, which had been run in place, were sawed off on a bevel. The split sleeve with these lead gaskets was then taken to the river and put together by the divers upon the joint to be repaired. Gaskets of extra heavy ½-inch soft lead pipe were used to make the joint in the longitudinal flange of the split sleeve.

In placing the second sleeve, instead of casting the lead gasket in place, as above described, the roundabout joint in the bell was made by winding a coil of extra heavy half-inch soft lead pipe about the pipe, driving it into the neck of the sleeve and calking it until a tight joint was obtained.

A 4-inch wrought iron pipe was then screwed into a hole tapped through a boss made upon the top half of the split sleeve, through which was introduced in the space between the outside of the pipe and the inside of the split sleeve surrounding it, a rich Portland cement grout made of one part of cement to 1½ parts of sand, the water and air which were displaced by the grout escaping through a similar 2-inch wrought iron pipe screwed into the top of the split sleeve. The grout was allowed to set under a head of about 6 feet for about 2½ days, when the grouting pipes were unscrewed and cast iron plugs were inserted in their place.

In this way flexible joints No. 2 and No. 8 were successfully repaired, the entire repair work being completed on March 4, 1905, and having involved the services of one diver for 39 days and an assistant diver for 26 days, in addition to the other labor required to tend the boiler, generator and derrick used in hoisting the excavated material out of the river bed.

China Lake Intake. In constructing the intake, a coffer dam 18 feet in width was first built out into the lake 330 feet from the shore by the contractor by driving two rows of piles 18 feet apart with piles 8 feet on centers in each row, to which were bolted two sets of 6x10-inch walings. Against these walings 2-inch spruce plank sheeting was driven by hand to the end of this first coffer dam, the extreme depth of water

being approximately 5 feet. From this point (330 feet from the shore) the coffer dam was continued in much the same way for an additional distance of 250 feet, except that 4-inch grooved and splined sheeting was used in place of 2-inch plank, and was driven by two pile-driving machines. The water at this outer section ranged in depth from 5 to 17 feet. Sand bags were then placed against the sheeting and earth was wheeled out on runways and dumped over the bags. Later on, when the ice was strong enough to bear the weight of a team of horses, carts were used for depositing this toe filling. A bulkhead was then driven across the coffer dam at a point about 300 feet from the shore, and the first section was pumped out and the excavation for the pipe line was made with little difficulty, though it became necessary to sheet the trench inside the coffer dam for a portion of the distance. The pipe was successfully laid in this trench between December 9 and December 16, 1904.

The effort was then made to pump out the outer section of the coffer dam; this was unsuccessful, however. More toe filling was then deposited around the sheet piling, and the piling was examined carefully by a diver and repairs were made at points where the sheeting had been forced out of position by stones encountered in the bottom of the lake. Renewed effort was made to pump out the coffer dam; still without success. Shortly after this came the abandonment of the contract, and the work was taken up by the District. Additional pumps were obtained so that there was upon the ground a machinery outfit consisting of one 8-inch and two 6-inch direct connected centrifugal pumps, and one 3-inch and one 4-inch pulsometer, and two portable locomotive type boilers of 25 to 35 horsepower each, in addition to two others in use a short distance away upon the steam drills. The orange-peel dredge outfit was also transferred from the river for use in dredging the outer section of trench.

It appeared to be wholly impracticable to maintain so long a section of coffer dam of this character at one time, and the section was therefore cut in two by a bulkhead, the plan being to lay the pipe in the middle section of the coffer dam, which

was about 115 feet in length, by pumping the water out of the coffer dam, and to lay the remaining portion, about 144 feet in length, by diver. The machinery was therefore moved into the new position and work was begun along this line. The middle section of the coffer dam was successfully pumped out after a few trials, the trench was excavated and the pipe was laid in it between February 28 and March 2.

The outer section of the coffer dam was then removed and the remaining pipes, 12 in number, (144 feet in length) were laid in three groups of 4 pipes each, calked on the shore and floated out and lowered, at the shore end of this section, into a trench excavated by the orange-peel dredge, and at the outer end of the section, on to granite piers previously built by the divers. The joints between these three groups of pipes were made by the divers under water by calking with coils of extra heavy ½-inch soft lead pipe.

At the end of the intake pipe a dry wall was built by the divers about 8½ feet long, 3 feet wide and 4½ feet high, with battered face, founded upon a granite underpining, and supporting the pipe about 2 feet above the lake bottom, and covering it by a layer of about 6 inches of masonry. In front of this wall was laid an apron of riprap covering an area of about 150 square feet. This work was completed on April 20, 1905.

The windrows of toe filling, remaining on each side of the pipe line after the sheeting was pulled, were then removed by the orange-peel dredge and placed in the trench over the pipe, so that no banks should be left in the shallow water, which would be exposed to the erosive action of the waves in times of storm, and which would tend to make the water roiley and lead to future complaint as to the character of the water sup ply. The advance of warm weather made it impossible to rely upon the ice to carry the weight of the orange-peel dredge, by which the toe filling was rehandled and the piles and sheet piling were being pulled, hence it became necessary to cap the lines of piles with stringers, and to lay a track upon which could run the flanged iron wheels supporting the platform upon which was mounted the orange-peel dredge and appur-

tenances. This not only materially increased the cost of this work, but delayed its final execution until May 24, 1905.

Intake Gate House. The introduction of water into the China lake pipe line is controlled by a gate house located upon the shore of the lake and about 600 feet from the end of the intake. The gate house was built with foundation, 10 feet in internal diameter, of rubble walls 24 inches in thickness laid in Portland cement mortar, on a 12-inch Portland cement concrete base. The height of the substructure from foundations to sill of building is approximately 17½ feet; the 24-inch inlet and outlet pipes have their inverts at elevation 161, about 18 inches above the floor, and are controlled by 24-inch sluice gates operated from the upper concrete floor at ground level by hand wheels. The foundation is surmounted by a circular brick wall 11 feet 10 inches in internal diameter, 10 inches in thickness, with 2-inch air space, covered with a shingle roof. The gate house contains a double set of screens, which consist of wooden frames covered with copper netting of 4 and 6 meshes per inch, 3 feet 10 inches in width by 6 feet in length in the clear, running in cast iron bolted sectional guides; they are handled by block and fall suspended from an 8x12-inch yellow pine timber spanning the walls.

China Lake Water Supply Introduced May 23, 1905. Work upon the China lake pipe line was substantially completed upon May 1, 1905, and after finally testing and thoroughly washing out the line, the China lake water was turned into the system for general use on May 23, 1905, at 5.30 P. M.

At the same time the gates for taking water from the Messalonskee stream were closed, and no water has been pumped into the system from the Messalonskee stream since that date. While emergency connections are maintained with Messalonskee stream for use in case there should ever be serious accident to the China lake pipe line, involving long delays in repairs, the gates have been sealed, and it is not anticipated that Messalonskee water will again be used. Should such an emergency arise, however, the public should be given ample notice of the fact in order to protect itself, by boiling the water, against possible injury from the use of a polluted supply.

Test of China Lake Pipe Line. It was the intention of your engineer to make test of the capacity of the China lake pipe line before completion of the work, but the lateness of the season, and certain other considerations, made it impossible to do so without material expense, and it was therefore thought best to postpone this until a more favorable time. Provision has been made, however, by the insertion of piezometer connections upon the pipe line at different points, for readily determining the friction losses in the line, and your engineer would advise that such a test be made next spring or summer when the conditions are favorable, and at intervals of say five years thereafter, in order to have a record of the deterioration of this pipe line by tuberculation of, or organic growth on, its interior surface. This work can be done readily and at small expense, and would, it is believed, be of permanent value to the District.

IMPROVEMENTS AT THE PUMPING STATIONS ON MESSALONSKEE STREAM

The crib-dam upon the old Arnold & Furbish privilege, previously referred to, spans the Messalonskee stream at a point just above pumping stations No. 1 and No. 2. The structure is approximately 12 feet high above the ledge bottom, with a crest approximately 4 feet in width and 42 feet in length, with a timbered slope, one vertical on two horizontal on the upstream face, and vertical cribwork on the downstream face. At each end of the dam are forebays for the wheel penstocks leading into the pumping stations, controlled by wooden gates at the face of the dam. In addition to this, on the easterly end of the dam spillway there was a sluiceway leading to the Arnold & Furbish mill located just below pumping station No. 2 on the easterly bank of the river. This has not been used, however, for some years and has now been permanently closed. The principal elevations of the dam are approximately as follows:

TABLE 15

Principal Elevations at Dam

	Elevation, "City Bench."
Crest	66.
Tail water	58.7
Top of 20-in. flashboards	67.7
Total fall	14 feet.

The crest of the John W. Butterfield dam below the Arnold & Furbish property is at elevation 53.3, with tail water at approximately 45.3, giving 8 feet fall on the lower privilege.

Messalonskee Stream Drainage Area and Yield. The watershed above the pumping stations covers an area of approximately 204 square miles; the storage upon this stream is exceedingly good, surpassing, at least so far as possibilities go, the wellknown Cobbosseecontee river drainage area. The lake surface, according to surveys of the United States Geological Survey, amounts to approximately 27.45 square miles. It is perhaps unnecessary to go into a detailed discussion of the power possibilities of the Messalonskee watershed with its storage under good control; suffice it to say that it should be capable of yielding a mean daily flow of water of 250 cubic feet per second, a dry weather flow in an ordinary year of 190 cubic feet per second, and in years of extreme drought a minimum yield of 150 cubic feet per second.

Power. The amount of power which could be developed with the above cited quantities of water, with flashboards upon the dam, in accordance with past practice upon this privilege, is as follows:

Quantity c. f. p. s.	Head, ft.	Theoret, h. p.	Efficiency.	Net h. p.
150	14	205	75 per cent.	154
190	14	260	75 per cent.	195
250	14	342	75 per cent.	256

The amount of power required to pump 3,000,000 gallons of water per day, or 4.65 cubic feet per second, the assumed future consumption of the District, against an estimated total

dynamic head of 270 feet, at the present time, is 142.5 H. P. (theoretical); with the new pipe system, and with a pressure of 60 feet upon the pump suction, instead of a suction lift of 24 or 25 feet (assumed), the theoretical power required would be 111.0 H. P. showing a saving of approximately 22 per cent.; and the amount of power required to pump 2,000,000 gallons per day, or less, the present consumption, would be less than two-thirds of the latter amount, or 74 H. P., a saving of about 50 per cent. in theoretical power required. The difference between these requirements and the estimated capacity cited above would seem to leave ample margin under all ordinary conditions for friction losses.

Necessity for Auxiliary Steam Plant. It is a fact, however, that at various times it has not been possible to pump the necessary water for the district by the power pumps. On at least one of these occasions the difficulty was overcome by installing an electric motor by which the power for pumping the water was developed. In other cases the pumping has been done by the Hollingsworth & Whitney Company, drafting water from the Kennebec river.

One cause for the shortage was known to be leakage under the crib-dam, and efforts had been made from time to time to repair this; unsuccessfully, however.

The matter was of sufficient importance to make necessary some repairs to curtail the leakage. Alternative plans were prepared by your engineer for a concrete dam to be located just below the present structure, carrying over it a masonry arch foot-bridge for convenience in operating the two stations. The work was found to involve a greater expenditure than appeared judicious at the present time, and it was therefore concluded to make repairs upon the present dam, which should stop its leakage and prolong its life for a further period of five or perhaps even ten years. Contract was let to Messrs. John L. Parkin & Son for the construction of a temporary coffer dam, after which the making of repairs was done by day-work. The repairs were very successfully and satisfactorily executed by them upon terms advantageous to the District.

A second cause which has led to unnecessary expense in the operating of this plant, has been the bad control of the storage basins upon the stream, and the conflicting interests in the water privileges located upon it. While it was believed that these conditions would undoubtedly be improved as time went on, there was no assurance of immediate or permanent improvement, and it was felt that any plan which involved in the control of these water works, dependence upon any of the manufacturing companies in the community for pumping the water supply, and particularly which should involve the use of either the Messalonskee stream or the Kennebec river as a source of water supply, polluted as they are, except under extraordinary conditions, was fundamentally wrong.

Moreover it should be added that since, on account of the small capacity of the old power pump No. 1, it could not alone supply the present consumption, it would have been impossible to make the necessary repairs upon power pump No. 2, or to install a new pump, without either having an auxiliary steam plant or making use, as formerly, of the Hollingsworth & Whitney Company's plant supplying unfiltered Kennebec river water. It might be added that the present power pump No. 2 seemed to have before it some years of further active service, making the purchase of a new power pump of larger capacity to replace power pump No. 1 unnecessary at the present time, and that the cost of such a power pump would have been in excess of the cost of a steam pump (excluding the cost of the buildings), and would not have given protection against the dangers of low water, or have furnished means of supplying the District at such time as the dam might be replaced by a new structure. It might also be added that the boiler plant is of advantage, incidentally, in furnishing heat for both pumping stations.

For these reasons an auxiliary steam pumping plant was installed.

While it is anticipated that this steam plant will not be used to any great extent, and that, as the control of the storage basins upon Messalonskee stream is improved, its use will

decrease still further, it may be noted that (principally on account of the repair work done about the station) the steam pump has been used to the following extent during 1905:

TABLE 16

Service of the Steam Pump, 1905

Month, 1905.	Days run.	Hours run.	Average daily run. Hrs. – Mins.	Monthly quantity pumped.	Demand for running.
Feb.	26	301	11 — 35	19,742,000	Trial of pump.
Mar	18	190	10 — 33	13,357,000	do.
May	9	69	7 — 40	9,445,000	Low water.
June	10	108	10 — 48	8,699,000	do.
July	11	107.75	9 — 48	6,146,000	do.
Aug	5	54.50	10 — 54	2,944,000	do.
Sept.	13	133.25	10 — 15	8,727,000	Low water and repairs on dam.
Oct.	29	290.75	10 — 0	15,500,000	Repairs on dam and pump No. 2.
Nov.	15	150.25	10 — 0	10,230,000	Repairs on pump No. 2.
Totals	136	1,404.50	10 — 20	94,790,000	

Steam Pumping Plant. Three rooms were added on the easterly end of pumping station No. 2, under contract with Horace Purinton Company; the first, the engine room 16½x31 feet; the second, the boiler room, 23x35 feet; the third, in an ell from the boiler room, the coal room, 16x20 feet, in one corner of which is located the chimney. The coal bin has a nominal capacity of 60 tons of coal, which can be materially increased in case of need.

An 80-foot brick chimney was built, founded on the ledge, with base 8 feet 4 inches square, and flue of 3 feet internal diameter.

The roof upon the old structure was removed and replaced with a new slate roof covering the entire building.

Contract was awarded to the Deane Steam Pump Company of Holyoke, Mass., for a compound, condensing, duplex steam pump, (14 and 26x16x18 inch) with jet vacuum pump (8x14x12-inch) and boiler feed pump, (5¼x3½x5-inch) on

the basis of competitive bids received from a number of makers. The pumps were erected by the contractor upon foundations prepared for them by the District. The main pump was guaranteed to develop, under twelve hour test, a duty of 55,000,000 foot pounds per 1,000 pounds of dry steam when pumping 3,000,000 gallons of water per 24 hours against a pressure of 110 pounds per square inch, with a steam pressure of 100 pounds at the pump.

Two 66-inch x 17-foot horizontal return tubular boilers (with 74—3½-inch tubes 16 feet long) giving approximately 1,220 square feet of heating surface, or 98 horsepower each, were installed. These boilers were built by the Portland Company of Portland, Maine, the lowest bidder.

The steam piping was furnished and installed by the Lumsden & Van Stone Company of Boston, the lowest bidder.

The water piping within the station was installed under contract with the Horace Purinton Company, who held the contract for building the addition to the pumping station.

Contract for covering the steam piping with two-inch layer of 80 per cent. Keasbey and Mattison magnesia covering, with outer jacket of canvas securing it in position, was awarded to the Nightingale & Childs Company of Boston, who submitted the most advantageous figure for doing this work.

A Clayton air compressor (5x6-inch, running at 129 revolutions per minute) capable of supplying air under any pressure up to 150 pounds per square inch, was installed for charging the air cylinders upon the pumps. This compressor was purchased from the George F. Blake Manufacturing Company. The air compressor is driven by a 12-inch Pelton wheel (running at about 1,159 rev. per min.) developing 4.9 horsepower with 13.4 cubic feet of water per second. This Pelton motor, which draws its supply from the city water pipes, was installed in preference to a steam driven air compressor in order that the air chambers might be charged at any time regardless of whether steam was on the boilers or not. It might be added that the air compressor is operated for but a few minutes every day. The installation has been found not only satisfactory, but necessary, for it is essential

to keep the several air chambers well filled with air when drafting supply directly from the China lake pipe line, in order to prevent danger from water hammer resulting from irregularity in draft of water by the pumps.

Pump Tests. Preliminary test of the steam pumping plant was made on May 3, 1905, at which time a duty of approximately 29 million foot pounds per 1,000 pounds of steam, as based upon the steam consumption of the main pump only, or 25 million foot pounds as based upon the steam consumption of the main and auxiliary pumps, was developed. Difficulty was also experienced in maintaining the steam pressure, in spite of the fact that the boilers were of ample capacity to supply steam for such a pumping plant. The developed duty was about one-half of the duty guaranteed, and the pump company was notified of the failure to develop the guaranteed duty on this preliminary test.

Arrangements were then made for a second test to be conducted jointly by the Deane Steam Pump Company and the District through its engineer. One of the portable locomotive type boilers which had been used upon the construction work was brought to the pumping station for the purpose of running the auxiliary machines, in order that the station boilers might be used simply for supplying steam to the steam pump. On May 12, 1905, the second test was made and difficulty was again experienced in holding the steam pressure. Indicator cards taken from the pump showed the trouble to be that steam, substantially at boiler pressure, found its way into the low pressure cylinders. Upon opening the valve chambers the steam slide valves, covering the entry and exhaust ports of the high pressure cylinders, were found tipped up and running upon a little ledge upon the side of the chamber, thus admitting steam, substantially at boiler pressure, from the high pressure to the low pressure cylinder; in other words the work was being done by the low pressure cylinders, and the pump was operating as a simple pump, instead of as a compound pump. The difficulty was immediately corrected by simply putting the valves into position again upon their seats, after which the pump readily developed the guaranteed

duty, as will be seen by the subjoined report of the tests conducted upon that day (see Appendix J.)

These tests were three in number covering 8-hour, 3-hour, and 5-hour runs, under different conditions. The first, when drafting water by suction from Messalonskee stream; the second, when drafting China lake water from the receiving well; and the third, when taking China lake water under pressure upon the suction end of the pump. The respective duties developed under these conditions varied from about 53 million to 55 million foot-pounds.

The same trouble with the tilting up of the steam valve was subsequently experienced, in spite of the assurance of the company that there was no danger of repetition of this difficulty. Repairs, which it is believed will prevent any possible recurrence of the trouble hereafter, were then made by the Deane Steam Pump Company at a very slight cost.

The failure of the pump to develop the guaranteed duty at the start, after erection by the pump company under the terms of their contract, involved one unfortunate result which was that coal was wasted during the period of operation until the valve was placed in its proper position. This was made a subject of claim against the pump company and deduction was made from the bill for the pump by the District in making settlement.

The pump company has not yet been willing to accept this settlement, and the matter is still under adjudication. It is believed, however, that the contention of the District will be sustained by the courts, should the pump company conclude to press the issue.

Receiving Well. The introduction of the China lake supply involved a change in the conditions under which the power pumps were operating, for under the new conditions, instead of drafting their supply from the Messalonskee stream with a lift of approximately 5 feet, water was to be delivered to the pumps under a pressure of about 30 pounds (static head), though, with increase in consumption and in age of pipe line, this pressure will be gradually reduced. Further, in drawing water from a pipe line of this length, (ap-

proximately 8½ miles) there was danger of injury from water hammer or ram, in case of careless manipulation of the pipe-line or of failure to keep the air chambers full of air.

The question of the ability of the pumps to withstand this pressure on the suction end was referred to the Deane Steam Pump Company and to Messrs. Dean & Main, mechanical engineers, of Boston. Both agreed that it would be unwise, if not dangerous, to operate the pumps under the new conditions, with direct pressure from China lake upon them, without changes. Steps were immediately taken therefore to replace the old suction bases upon power pump No. 2 with new ones of heavier design, which would be adequate for the new service. No change was made in power pump No. 1, as the pump is smaller and of different design and it was not thought expedient to go to any unnecessary expense in work upon this pump, which had already been outgrown and which was used merely as an auxiliary machine, for operation at night or at times of very low consumption.

As a preliminary to throwing these power pumps out of commission for making repairs and improvements, and in order to avoid the loss involved in having to pump the supply by steam, instead of by water power, by the remaining power pump, while one power pump was out of commission for repairs, it was thought wise to build a masonry receiving chamber beside the pumping station, into which the China lake pipe line should discharge, and from which any of the pumps could draft their supply without pressure or danger of water ram. The construction of this chamber had the further advantage of giving greater flexibility in the operation and control of the plant.*

A concrete well 27 feet in internal diameter, and approximately 6 feet in depth, having an available capacity of 26,350

* Thus at such times as it may be necessary to throw the reservoir out of commission for any reason, it would be necessary to pump directly into the mains. Under these conditions the fluctuations in draft or consumption of water with the pumps taking water under direct pressure from China Lake through 8½ miles of the 20 and 24-inch pipe of the China Lake pipe line might well result in producing a very serious, if not dangerous, water ram upon the pipe system. It would thus be safer and wiser to discharge the water from the China Lake pipe line into the receiving well, and to let the pumps draft their supply from this well, without danger of water hammer from the long supply main.

gallons, was therefore constructed, on the southerly side of, and adjacent to, pumping station No. 2. Into this well the China lake pipe line discharges, through an 8-inch pipe controlled by a gate and an 8-inch Ludlow balanced valve with copper float, and an additional 12-inch pipe controlled by a gate, the idea being to regulate the 12-inch valve so as to supply something less than the absolute quantity of water required, leaving the 8-inch line with balanced valve to take care of the minor fluctuations, thus conserving the water supply and regulating it without danger of producing water ram upon the pipe line.

To further protect the pipe line and the pumps from the danger of water ram, the 16-inch pipe bringing the China lake water into the pumping station has been made to terminate in a quarter bend pointing upwards, on the end of which has been placed a large steel air cylinder 4 feet in internal diameter and 10 feet long, made of ½-inch steel plate, double riveted, and with dished heads, while the pump supply is taken off by a wye from this pipe line. Two 6-inch relief valves have also been placed upon the end of the pipe line, and the suction air cylinders upon the new pump, and that placed upon pump No. 1, replacing the old air cylinder, have been made of unusually large capacity. A cast iron air cylinder has also been inserted at the summit of Pooler's Hill, lying between the Kennebec river and Messalonskee stream; the latter may be charged by a hand pump; and an air valve, controlled by ball cock, is also supplied, through which any excess of air rising to this point may be discharged, in order that the yield of the pipe line may not be reduced by this air pocket. The air cylinders in the pumping station are all connected with, and charged by, the Clayton air compressor referred to above.

Repairs Upon Power Pumps. The necessity for making repairs or changes upon the power pumps, in order to admit of their use with the direct pressure from the China lake pipe line upon them, has been referred to above. Not only conditions of safety, but economy in operation, required these repairs, for the difference in total head to be pumped against when drawing water directly from the China lake pipe line.

instead of drawing it from the receiving well, involved a saving in power of about 20 per cent.

Repairs were first made upon power pump No. 1. Adjustments were made in the alignment, worn brasses and scored journals were replaced, and stiffer springs and new valves were put on the suction deck, and the old air chamber upon the suction pipe, built of thin sheet steel, was replaced with a cast iron cylinder (none too soon, for the old cylinder gave way after the receipt of the new cast iron chamber, and before its installation).

Power pump No. 2, which was badly out of line, and the foundation bolts of which had never been secured rigidly to the foundation, was then taken in hand. A 12-inch layer of Portland cement concrete, reinforced with steel rods, was built over the old brick foundation, encasing it in part. In order to tie the foundation securely together the foundation bolts were grouted into position, after the pump had been overhauled and put into place again upon the foundation. The old and weak suction bases were replaced by heavier suction bases, the alignment of the pump was improved, the suction springs and valves were replaced by stiffer material, one of the pump rods, which had been badly scored, was replaced, and the bearings and journals were rebabbitted and repaired as necessary.

Other Improvements at the Pumping Stations. New Portland cement concrete floors were laid throughout pumping station No. 2, and the wooden partition between the wheel room and the power pump room was replaced by a cement partition plastered on metal lath; all to reduce risk from fire.

Both stations were equipped with steam heat (drafted from either of the boilers in pumping station No. 2), electric light, and air pipes for charging the air chambers upon the pumps and the pipe line. A simple toilet room and lockers were also provided in pumping station No. 2 for the use of the engineers and firemen.

For convenience in operation and ready access to both buildings, as well as to carry the new and heavy 16-inch suction and discharge pipes across the Messalonskee stream, a

steel Pratt truss of 75 feet span was built between the two pumping stations, at comparatively small expense.

REINFORCEMENT AND EXTENSION OF THE PIPE DISTRIBUTION SYSTEM

Pipe Distribution System of 1905. Allusion has already been made to the fact that it was thought wise to obtain additional legislation before undertaking the extension and reinforcement of the pipe distribution system in the District. This legislation was obtained early in the year 1905, and preparations were thereupon made for taking up this work during the summer season.

The postponement of this extension work from the year 1904 to the year 1905 unfortunately involved increased cost in construction on account of the advance in current prices for supplies and work, amounting to perhaps 20 per cent., and on account of the longer period of supervision involved.

Old Pipe System. The general character of the old pipe system is shown in Table 1, page 35. The large amount of small wrought iron pipe is striking, upwards of 41 per cent. of the total pipe being 3 inches or less in diameter. Briefly stated, the old pipe system had been badly outgrown. Not only was this fact clear from a casual inspection of the pipe system, and from computations upon possible friction losses with drafts of different quantities of water for fire protection purposes, at different points in the several communities, but also from the pressure gage at the pumping station, which indicated a rapidly increasing pressure with comparatively small increase in consumption. The fact that the water supply had proven sufficient in the majority of fires which the community had experienced is accounted for by the heavy pressure carried upon the mains. The practical limit of such pressure had, however, been reached and surpassed, so that it was no longer possible to make good the deficiency in diameter of pipe by increasing the pressure (and hence the availa-

ble head for friction loss) to admit of delivering sufficient quantity of water under adequate head, in case of heavy draft for fire protection purposes. This was made clear on several occasions by the bursting of service pipe connections or mains, whenever the pressure was raised materially above the ordinary pressure, already high. It also involved large leakage at points where there was opportunity for any leakage.

Plans were therefore made for relaying certain mains with pipes of larger diameter, as well as for extending the pipe system to meet the reasonable requirements of the community. In making these improvements the question of adequate fire supply was clearly borne in mind, and to supply this a material expenditure was made from which no benefit is derived, so far as revenue from the consumption of water is concerned, though the community does benefit of course in the greater security against fire. The pipe reinforcements and extensions are shown in Appendix K.

It might be added that the friction loss in the system, during times of heavy draft for fire, will probably not be more than one-half of the former loss from this source. This matter is also referred to in the discussion upon hydrants and fire protection, in a later paragraph of this report.

Pipe Reinforcement and Extension. Briefly stated, the pipe distribution system has been improved and enlarged in the following manner. The old pipe was removed and new pipe substituted along the following streets:

On Western avenue from the pumping station to Elm street, 16-inch pipe.

On Western avenue from Elm street to Silver street, 14-inch pipe.

On Silver street from Western avenue to Main street, 14-inch pipe.

The 14-inch pipe discharges into two 12-inch pipes, one running to the reservoir through Charles, Temple, Main, Chaplin, Ticonic, and Oak streets, and Drummond, Deer Park and Central avenues, into the 14-inch line leading from College avenue to the reservoir; the other branch, through Main and Lockwood streets over the Ticonic bridge to Winslow. Other

reinforcement lines were laid from the corner of Western avenue and Silver street into the heart of "The Plains" by way of Silver, Gold, King and Pine streets to Grove street; and from the reservoir line to the Fairfield bridge, by way of Drummond avenue, West street, Summit avenue, High street and Lawrence avenue to the canal. In addition to these there were a few other pipe reinforcements of minor importance. Pipe extensions were made west of Messalonskee stream, upon "The Plains," and in Collins street and Eastern avenue, all in Waterville; upon West and Island streets in Fairfield; and substantially the entire system in Winslow. The contemplated extensions in Benton were not made, on account of the failure of the people of Benton to take any action leading toward the installation of additional hydrants. In addition to the above extensions there were some others of minor importance. The total mileage of pipe laid in reinforcement and extension of the pipe distribution system amounted to 10.57 miles.

Contract for Cast Iron Pipe and Specials. Competitive bids were received on March 23, 1905, for cast iron pipe and specials for the work upon the distribution system. These bids are shown in Appendix L. Of these, bid No. 4, that of Charles Millar & Son Co. of Utica, N. Y., was the lowest, but this foundry was not able to guarantee complete delivery before September, and it was necessary to have the pipes on hand at the earliest possible moment in order not to hamper the construction work. Of the remaining bids, those of The Warren Foundry & Machine Company, and of the United States Cast Iron Pipe & Foundry Company were substantially identical, the difference in cost being about $75. Contract was therefore awarded to The Warren Foundry & Machine Company on account of the better deliveries which were guaranteed, and of the good reputation of this company in living up to "delivery guarantees." The pipe finally ordered of The Warren Foundry & Machine Company, for use during the season of 1905, is shown in Appendix M. The deliveries were made in a very satisfactory manner, and within the guaranteed time.

Pipe Laying Contract. Detailed specifications were prepared by your engineer covering "Reinforcement and Extension of Distribution Pipe System, Contract 20, for Laying Cast Iron Water Pipe and Appurtenances in Waterville, Winslow, Fairfield and Benton, Maine, April 1905." A pamphlet was printed containing the advertisement of this work (which was published in the various local papers, as well as in the "Engineering News" and "Engineering Record"), the proposal, the contract and specifications, and the form of bond for use upon this work.

On April 29, 1905, the proposals were opened. But three bids were received, probably in consequence of the experience of the contractor on the China lake pipe line and rumors or statements resulting from that experience. These bids are shown in Appendix N. It might be added that in addition to the proposals submitted under the terms of the advertisement, two others, which contemplated the doing of the work on the "cost-plus-fixed-profit" basis, were received and rejected.

Contract was awarded to the lowest bidder, the Boylston Construction Company (which consisted substantially of the firms, Bruno, Salomone & Petitti, and Long & Little), and was executed on May 10, 1905. Upon May 29, 1905, work was begun, and although there were some delays in the organization of the force, the work progressed on the whole very satisfactorily, and was substantially completed within the contract time limitation on September 30, although there were a few men upon the ground up to October 7, 1905.

Considerable difficulty and additional cost was incurred by the contractor in consequence of the irregularity of the trench work and pipe laying under the original construction of the works, and the desire to lay the new pipe line replacing the old in the best possible manner; and further, on account of the necessity of maintaining the supply in the houses connected with the system during the reconstruction of the several pipe lines, in accordance with the desire of the Trustees to reduce the inconvenience to the property owners as much as possible. For the latter reason a small pipe distribution system of wrought iron pipes was laid upon the sur-

face, drawing water from a nearby hydrant or directly from the main, and connected through the sill-cock or other convenient street connection with the houses supplied along the line in which the mains were to be relaid. This involved additional expense to the District, but it is believed that the expense was justified.

The river crossing from Waterville to Winslow was made through a 12-inch cast iron pipe laid over the Ticonic bridge. As originally planned this pipe was to be laid in a wooden box under the sidewalk upon this bridge. This method was objected to by the selectmen of Winslow, in spite of the fact that it was advised not only by your engineer, but also by the designer of the bridge, to whom the plans were submitted. In response, therefore, to the wishes of the Winslow selectmen the pipe was laid upon a wooden platform, suspended underneath the roadway over the Ticonic bridge and located midway between the two trusses. This platform was very cleverly and rapidly constructed by Messrs. J. L. Parkin & Son, of Fairfield, under contract with the District. The pipe was then laid upon the suspended platform. Slip joints, formed by the use of cast iron sleeves surrounding the pipe spigot, from which the bead had been removed, were then provided on the movable ends of the several trusses, and the pipe was covered with a triple layer of hair felt, secured in position by a waterproof paper, the whole surrounded by a canvas jacket, sewed together and thoroughly painted with three coats of paint. The additional cost to the District of this pipe line laid across the Ticonic bridge upon a suspended platform, instead of in a box under the sidewalk as originally planned, amounted to about $1,700, as shown by the following statement:

TABLE 17

Excess Cost of Pipe on Suspended Platform Under Ticonic Bridge

Contract for building platform J. L. Parkin & Son....		$2,284.50
Laying pipe by day labor J. L. Parkin, laying....		40.00±
Boylston Constr. Co. calking..		82.83
Covering the pipe Nightingale & Childs Co.....		605.00
Painting the covering James Clarkin		140.00
Work upon stone abutments Mason .....$25.00±		
Labor ..... 11.67±		36.67
		$3,189.00
Less Cost if built by Bolyston Construction Co. as per contract, 560 lin. ft. @ $2.65		1,484.00
Excess cost .		$1,705.00

The amount of work done under the contract of the Boylston Construction Co. is shown by the final estimate appended hereto (Appendix O.) It will be noted that a balance has been retained under the terms of the contract to cover the cost of repairs and cleaning up work which will have to be done in the spring, after the completion of which final payment will be made to the contractor.

The work as a whole requires little comment beyond acknowledgment of the spirit of fairness and desire to do thoroughly satisfactory work exhibited by the contractors.

Hydrants. On April 28, 1905, your engineer, in company with your counsel, met his Honor the Mayor of Waterville, and the members of the street committee, at their suggestion, and outlined to them the proposed plans for reinforcement of the distribution pipe system in the District, and discussed

with them the urgent need of installation of additional hydrants to make available to the community the benefits of the new work. As a matter of record and for the convenience of the Trustees, the matters dwelt upon at this meeting were made the subject of a brief report upon "Additional Hydrants in Waterville" under date May 10, 1905. It may be of interest to quote from this a few statements bearing upon the hydrant situation.

After submitting a tabular statement giving the population, number of hydrants and hydrant rental paid by the city of Waterville during each of the past ten years, the following comments were made:

"The rental for each additional hydrant is $30 per year. Note that while the population has increased by 33 per cent. in the past decade, the number of hydrants has not kept pace with this growth, their increase being only 21 per cent.

"Of far greater importance is the fact that while the total mileage of pipe in Waterville south of the reservoir line, traversing a region not only suitable for building purposes but actually being built upon, materially exceeds twenty miles, the total number of hydrants is but 70, making the average distance between hydrants upwards of 1,500 feet, with many larger intervals, owing to the fact that in certain districts the hydrants are less than 600 feet apart. This is very bad practice, for it is a well recognized and generally conceded fact that hydrants should be located not more than approximately 600 feet apart in the residential districts, and from 300 to 500 feet apart in the closely built up business section of a town or city.

"As a result of a careful study of the local situation, I advise installing 50 new hydrants in Waterville, upon the proposed pipe system (old and new), and suggest the desirability of 12 more, which would, however, require the laying of additional street mains, all of which hydrants are shown upon the plan and enumerated in the enclosed table. This would make the average hydrant interval from 900 to 1,000 feet, and in the business and residential portion of the city approximately 600 feet.

"In a city of the size and character of Waterville, it should be possible to mass at least eight fire streams upon buildings in the closely built business district, and upon the large mills, and from four to six streams in the residential districts, without requiring the use of exceedingly long lines of hose.

"The older and business portions of the city are fairly well protected today by hydrants, though here and there additional hydrants should be inserted, but as much cannot be said of other districts. Thus if the necessary hydrants are installed the pipe system may safely be counted upon to deliver from 10 to 12 first class fire streams in the district north of Western avenue, and from 5 to 7 such streams upon the plains, under a pressure at the hydrant of from 80 to 90 pounds per square inch.

"Compare with these facts and figures the conditions existing upon the plains. In the district north of Gold street, (and lying between Silver, Sherwin and Water streets) comprising an area approximately 1,100x1,200 feet, there is but one hydrant within the area in addition to the 6 hydrants upon its periphery; and in the district south of Gold street comprising an area approximately 1,800x700 feet there are no hydrants within the district and but five located upon three sides of its periphery. Moreover the added danger from hydrants temporarily out of commission, as for instance on account of freezing in intensely cold weather, making necessary longer lines of hose to neighboring hydrants in case of fire, should not be overlooked.

"While the increased hydrant rental resulting from the installation of so many new hydrants may seem large to those who have not given the matter careful thought or study, it is certainly warranted by the needs of the city.

"Attention might also be called to the fact that the city would effect some annual saving in hose required, and that whatever benefit accrues to the Kennebec Water District through increased revenue for hydrant rental will revert to the consumer in the shape of reduced water rates. It might be added that this is in accord with an equitable consideration of the subject.

"I have not referred to the insurance question, as I am not informed upon the rates paid in Waterville. It seems likely that with the suggested improvements some reduction in premiums might be anticipated. Certainly the fire service would be far more effective than today."

Subsequently the installation of 19 additional hydrants in Waterville was ordered by a special fire committee. Competitive bids were asked for from several of the leading hydrant manufacturers, whose hydrants were already in use in these works, upon 25 hydrants; the number was subsequently increased to 29, covering 19 for Waterville; 9 for Winslow and 1 for Fairfield. Contract was awarded to the Chapman Valve Manufacturing Co., the lowest bidders. (See Appendix P.) After the arrival of the hydrants upon the ground the installation of those ordered for Waterville was held up by the Mayor, and but 9 of the 19 originally ordered were installed. It seems unfortunate that the city did not find itself in a position to order more extensive hydrant installations in view of the excessively long distances between hydrants in certain districts, and it is certainly to be hoped, in the interests of good fire protection, that a more liberal policy may be possible hereafter. Since the payment of larger total hydrant rental will come back to the consumers hereafter, in the shape of reduced water rates, it seems unfortunate that the public should not have the benefit of the additional protection, which it can have without material expense.

Since the completion of the pipe reinforcement work, the fire insurance rates in the business district have been lowered slightly.

North Vassalboro Water Supply. The China lake pipe line passes through the middle of the village of North Vassalboro. The pressure at this point corresponds to a head of about 40 feet at the present time, but with the increase in consumption this head will be reduced by the amount of the additional friction loss. At your request investigation was made of the cost of installing a suitable water supply in the village of North Vassalboro. The plan outlined contemplated the pumping of water from the China lake pipe line, by means

of a kerosene or gasolene engine, into a standpipe or reservoir located at a suitable elevation upon the hill, and the introduction of a pipe system which should furnish adequate domestic and fire service. The estimated cost of construction and maintenance of this system are appended. (See Appendix Q.) It should be added that the estimate of rock excavation was not based upon any soundings, but merely upon surface examination.

GENERAL ITEMS RELATING TO CONTRACT PRICES AND COST OF WORKS, ETC.

For convenience in reference the subjoined table is appended. It comprises a summarized list of contracts awarded in the execution of the work described above, during the years 1904 and 1905. The list was kept by your engineer, as a memorandum, for his own convenience. It should be noted, however, that the prices given do not in many cases represent the precise final payments made, but the estimated cost of the work based upon the estimated amount of work to be done under the contracts awarded. In most cases, however, the items agree fairly closely with the final statements and comparison can of course readily be made with the figures shown by the books of the treasurer. In addition to the contracts shown upon this list, sundry other small orders were placed with different companies or concerns, which are not classified herein, the amounts involved being too small for particular mention in this way. It may be said, however, that the general policy was adopted of obtaining competitive quotations upon everything of substantial moment, and to place order with local concerns so far as possible and advantageous.

TABLE 18

Kennebec Water District, List of Contracts—1904 and 1905

Contract No. 1. For CAST IRON PIPE AND SPECIALS. To R. D. Wood & Co., Philadelphia. Dated June 23, 1904 (by letter of Harvey D. Eaton, Esq.) Delivery of materials between July 15th and Oct. 15, 1904. Approximate price $100,000. First payment between Sept. 1st and 10th, approximate $25,000. (see also Appendix A.)

Contract No. 2. For PIPE INSPECTION. To Wm. R. Conard, Burlington, N. J. Dated June 24, 1904. (By letter of L. M.)

Contract No. 3. For LAYING CAST IRON PIPE from China Lake to Pumping Station. To Loring N. Farnum, 53 State St., Boston, dated July 22, 1904. Completion Dec. 15, 1904. Contract amount $76,504. Monthly payments.

Contract No. 4. For VALVES AND VALVE BOXES. To Rensselaer Mfg. Co., Troy, N. Y. Dated July 25, 1904. (By letter of L. M.) Delivery about 30 days. Amount about $3,024. (Final amount including orders in 1905 about $4,800.)

Contract No. 5. For AUXILIARY STEAM PUMP 14" and 26"x16"x18", and 8"x14"x12" vacuum pump and 5¼"x3½"x5" boiler feed pump. To Deane Steam Pump Co., Holyoke, Mass. Dated July 25, 1904. (By letter of L. M.) Delivery in 50 days. Price $3,700+$125 for Mason governor.

Contract No. 6. For 16" VENTURI METER AND MANOMETER. To Builders Iron Foundry, Providence, R. I. Dated July 25, 1904. (By letter of L. M.) Price $300.70 net f. o. b. Waterville.

Contract No. 7. For MANHOLE FRAMES, COVERS, STEPS AND SCREENS AND GUIDES. To Webber & Philbrick, Waterville, Me. Dated July 25, 1904 (by letter of L. M.) Delivery of materials probably 30 days. Amount 2½c. per pound upon cast iron work and 11½c. each upon steps. (Later, split sleeves, bound marks, floor castings, repair work, total about $1,200.)

Contract No. 8. For PORTLAND CEMENT. To Alpha Portland Cement Co., 521 Board-of-Trade Bldg., Boston. Dated July 25, 1904 (by letter of L. M.) Price $1.80 per bbl. in wood. Delivery of 500 bbls. within 30 days. Order likely to be increased by 300 bbls.—$1,440 delivered.

Contract No. 9. For 2-66"x17' HORIZONTAL TUBULAR BOILERS, with 74, 3½"x16' tubes, 80 H. P. each (at 15 square feet) and approximately 1,220 square feet heating surface each. To Portland Co., Portland, Maine. Dated Aug. 3, 1904. Delivery in 4 or 5 weeks. Price $844 each.

Contract No. 10. For BUILDING PUMPING STATION EXTENSION, ETC. To Horace Purinton Co., Waterville, Maine. Dated September 28, 1904. Completion Jan. 1, 1905. $7,443.

Contract No. 11. For CONCRETE DAM AND BRIDGE. Postponed.

Contract No. 12. For CAST IRON WATER PIPE SPECIALS IN PUMPING STATION. To the Lumsden & Van Stone Co., 69 High St., Boston. Dated Sept. 30, 1904, 3⅛c. per pound f. o. b. Waterville; bolts at 70 per cent. discount from list. About $1,200. Completion Nov. 5, 1904.

Contract No. 13. For STEAM AND SMALL WATER PIPING IN AUXILIARY STEAM PLANT. To the Lumsden & Van Stone Co., Boston, Dated Oct. 24, 1904. $970. (This includes cartage and erection of boiler and smoke flue.)

Contract No. 14. For 8" BALANCED VALVE AND FLOAT. To the Ludlow Valve Mfg. Co., 150 High St., Boston. Dated Oct. 1, 1904. $80 f. o. b. Troy, N. Y.

Contract No. 15. For SMOKE FLUE AND AIR CYLINDERS. To the Portland Co., Portland, Maine. Dated Sept. 29, 1904. Smoke flue $125, C. I. Air cylinder at 3¾c. per pound. Steel air chamber 4'x10' with 16" quarter bend and pedestal $225. Completion in October.

Contract No. 16. For SUCTION WELL. To Horace Purinton, Waterville, Maine. Dated Sept. 29, 1904. Furnish all labor and material except cement, pipe fittings, etc. Price $1,000.

Contract No. 17. For STEAM PIPE FOR HEATING STATION. To George L. Learned & Co., Waterville, Maine. Dated January, 1905. To supply all labor and material. Price $287.22.

Contract No. 18. For COVERING STEAM PIPING AND BOILERS. To Nightingale & Childs Company, Boston, Mass. Dated Jan. 20, 1905. To cover all specified pipes and fittings with Keasbey & Mattison Company magnesia covering 85 per cent. pure carbonate of magnesia. Price $94.

Contract No. 19. For CAST IRON PIPE AND SPECIALS. To Warren Foundry & Machine Co., New York City. Dated April 1, 1905 (by letter of L. M.) Delivery to be made all rail Waterville, Winslow

& Fairfield, to begin shipment on or before May 1 and complete July 15; rate $29.75 per ton of 2,000 pounds f. o. b. Waterville, Winslow & Fairfield 2⅞c. per pound for special castings. Payments aggregated $51,615.40.

Contract No. 20. For REINFORCEMENT AND EXTENSION OF DISTRIBUTION PIPE SYSTEM. To Bolyston Construction Company, West Boylston, Mass. Dated May 10, 1905. Complete Sept. 30, 1905; contract amount $36,697 monthly payments. Payments aggregated $34,937.70.

Contract No. 21. For 8-INCH GALVANIZED WROUGHT IRON PIPE. 640'-8" of pipe, 4 sweep bends, 4 expansion joints, and couplings for Fairfield and Benton Bridges. To Lumsden & Van Stone Company, Boston, Mass. (by letter of L. M. May 22, 1905) Amount $1,066.

Contract No. 22. For REINFORCED PUMP BASES AND SUCTION ELBOWS; Also repairs on power pump No. 2. To George F. Blake Mfg. Company, Boston, Mass. Dated July 7, 1905 (letter L. M.) Price, suction base $475, suction elbows $160 f. o. b. Boston; also to furnish competent man at $6 per 10 hour day, plus travelling expenses and board. Air chamber for pump No. 2—$85. Total $1,757.39.

Contract No. 23. For STEEL PIPE BRIDGE, span 75', width 7', depth 9'-6", connecting the two pumping stations. To New England Structural Company, Everett, Mass. Dated July 24, 1905 (letter of L. M.) Price $650 complete, erected in 4 weeks time.

Contract No. 24. For SUSPENDED PLATFORM UNDER TICONIC BRIDGE. To J. L. Parkin & Son, Fairfield, Maine. (letter of L. M. Aug. 17, 1905) Furnish all material and labor, commence in 10 days, complete in 2 weeks. Price $2,280.

Contract No. 25. For COFFER DAM FOR REPAIRS TO PUMPING STATION DAM. To J. L. Parkin & Son, Fairfield, Maine. $500. Repairs by day work estimated $300.

Contract No. 26. For PIPE COVERING ON BRIDGES. To Nightingale & Childs Company, Boston, Mass. Dated about Oct. 18, 1905. 3 layers tarred paper, 3 layers half-inch hair felt, 1 layer resin-sized sheathing paper, fastened with copper wire, 1 layer heavy canvas sewed on; does not include painting. Price 16" pipe $1.35½ per ft.; 12" $1.10 per ft.; 6" $0.59½ per ft. Total $933.24.

Contract No. 27. For GRANOLITHIC FLOOR AT PUMPING STATION. To Eastern Expanded Metal Company, Boston (letter L. M. Nov. 24, 1905). Furnish all material and labor; 3" floor on the ground with 1" additional granolithic finish; also reinforced concrete floors in all parts where shown with 1" additional granolithic finish; price $466; not to include any filling or cutting into the brickwork, etc. (+$54.30) (Purinton for plastering on metal lath $18.52).

Contract No. 28. For HYDRANTS. To Chapman Valve Mfg. Company, Boston, Mass. (letter L. M. Sept. 6, 1905) 23—5" hydrants with two 2½" hose nozzles, one steamer nozzle, with rubber valves which can be replaced without taking up hydrant; 6" bells and no frost case, 6 ft. depth from surface to center of bell, $29.20 each. Two 6" hydrants with 8" bells, three 2½" independent gated nozzles, 1 steamer nozzle, with rubber valves as above, depth as above, price $49.20; delivery f. o. b. Waterville complete not later than Sept. 27, 1905—about $900.

Contract No. 29. For PAINTING PIPE COVERING ON BRIDGES. To James Clarkin, Waterville, Maine 3 coats best lead and oil paint—$195.

Contract No. 30. For STEAM HEATING PUMPING STATION No. 1. To George L. Learned & Company, Waterville, Maine. Day labor amounted to $100 or $120—see Mr. Boutelle's records.

Contract No. 31. For PAINTING WALLS OF PUMPING STATION. To James Clarkin, Waterville, Maine. 1 coat of oil containing small amount of varnish (sizing) 2 coats best lead and oil paint, price $155.56.

Engineer Corps. The engineer corps employed upon this work in Waterville, aside from the consulting engineer, is shown below. Local men were employed as far as possible.

ENGINEER CORPS IN WATERVILLE, 1904-1905

William T. Barnes, Mar. 28, '04—May 15, 1905, Resident Engineer.

Frank H. Carter, April 11, '04—May 20, '04 & Oct. 1, '04—Feb. 1, '05, Asst. Engr. on Pumpg. Sta.

Ralph H. Rockwood, April 4, '04—Nov. 14, '04, Asst. Engr. on Surveys & Pipe Insp. at Wiscasset.

Leonard C. Robinson, April 15, '04—Feb. 28, '05, Asst. Engr. on Surveys & Insp. River Crossings & Lake Intake.

Harry L. Kimball, Sept. 10, '04—Nov. 25, '04, Asst. Engr. & Insp. Pipe Line.

Edson F. Hitchings, Sept. 20, '04—Feb. 16, '05, Office Assistant.

Charles Farrington, Sept. 9, '04—Nov. 7, '04, Inspector.

Benj. E. Brann, April 4, '04—Dec. 24, '04, Transitman & Inspector.

George R. Cook, April 4, '04—May 20, '05, Rodman & Inspector.

Walter M. Vose, April 4, '04—Dec. 24, '04, Chainman & in charge Pipe Distribution.

Leslie D. Williams, April 4, '04—June 30, '04, Chainman.

Scott B. Stewart, July 5-23, '04—Nov. 19-Dec. 3, '04, Inspector.

George F. Crosby, April 12, '04—Mar. 4, '05, Asst. to Engr. Corps.

1905

William T. Barnes, May 15, '05—Dec. 31, '05, Resident Engineer.

Leonard C. Robinson, May 12, '05—Dec. 21, '05, Asst. Engr. Pumping Sta.

George A. Sampson, June 1, '05—Dec. 31, '05, Asst Engr. Distribution System.

Benj. E. Brann, June 7, '05—Sept. 15, '05, Insp. Distribution System.

Fred H. Rose, May 22, '05—Dec. 27, '05, Insp. Distribution System.

Arnold W. Totman, June 10, '05—Sept. 16, '05, Insp. Distribution System.

Mr. Harry E. Green and his men were also pressed into service from time to time and rendered valuable assistance.

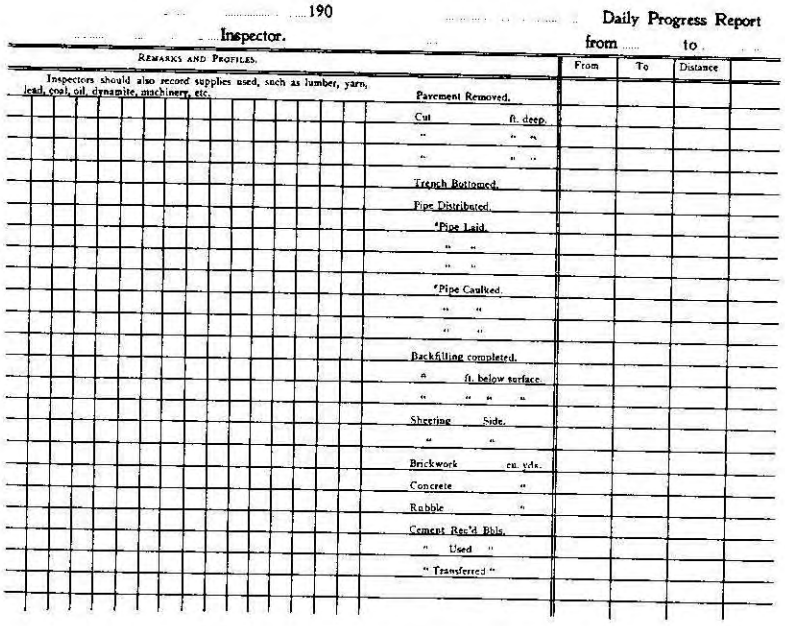
Great credit is due the men upon the engineer corps for the interest and fidelity shown by them upon the work, for much of this work was of an exacting character. Without additional compensation or complaint, the men worked at times not only all day (and every day in the week) but often well on into the night. Moreover upon the Farnum contract the work progressed substantially continuously from September until December, seven working days in the week, without regard for Sunday, so that the only relief which the engineer corps had was upon occasional rainy days, when some of the men could be spared, or when it was possible to send substitutes, to enable the men to get off for a few hours or portion of a day.

Records Kept By the Engineer Corps. In addition to notes, records and reports upon the current work, daily "force-account" records were kept by the different inspectors upon the work under the direction of the resident engineer, upon forms prepared by your engineer for the purpose, and shown below, considerably reduced in size. These force-accounts showed the estimated cost of the work to the contractor and furnished the data from which the "progress profile" and "monthly estimates" were prepared. These force-accounts have all been tabulated and worked up in detailed and summarized form, as a matter of permanent record. The results are not reproduced here, as this would have involved unnecessary expense without particular advantage, but they have been placed on file with the Trustees for reference and record.

Daily Force Account, ... 190

from ..... to ..... Inspector .....

	Hourly Rate $	TOTAL.																	
		Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.	Hrs.	Amt.
Supt.																			
Foremen.																			
"																			
Mechanics																			
"																			
"																			
Masons.																			
" Helpers.																			
Drillers.																			
" Helpers.																			
Pipe Caulkers.																			
" Leadmen.																			
" Layers.																			
Laborers.																			
"																			
"																			
"																			
Pumpers, Day.																			
" Night.																			
Teams, Double.																			
" Single.																			
TOTAL.																			



.....190 Daily Progress Report

.....Inspector. from ..... to .....

Remarks and Profiles. Inspectors should also record supplies used, such as lumber, yarn, lead, coal, oil, dynamite, machinery, etc.		From	To	Distance
	Pavement Removed.			
	Cut ft. deep.			
	" " "			
	" " "			
	Trench Bottomed.			
	Pipe Distributed.			
	*Pipe Laid.			
	" "			
	" "			
	*Pipe Caulked.			
	" "			
	" "			
	Backfilling completed.			
	" ft. below surface.			
	" " " "			
	Sheeting Side.			
	" "			
	Brickwork cu. yds.			
	Concrete "			
	Rubble "			
	Cement Rec'd Bbls.			
	" Used "			
	" Transferred "			

Records of the Work. The tracings of the various plans for the work, and the original force-accounts and force-account sheets and notes are of course on file at your engineer's office in Boston, where they may be consulted at any time.

From these plans a set of record prints (blue prints) showing essential details of construction have been made up and placed on file at the office of the Trustees in Waterville. In addition to these there have been placed on file with you, gate location books made in duplicate in the form of blue prints, location books of special castings laid in the pipe distribution system (in duplicate), force-account record sheets with summaries covering the contracts let to Mr. Loring N. Farnum and to the Boylston Construction Company; photographs of construction; and construction record books, prepared at your request, giving lists or tabulations of pipes, valves and hydrants in the system, with details relating thereto; and a new pumping station record book.

Data have also been prepared at request of your counsel for use in the suit against The United States Fidelity & Guaranty Company, surety for Loring N. Farnum, to recover the amount of his bond.

Descriptions covering the China Lake pipe line location and the land taken at China lake have been prepared and filed with those takings.

In conclusion the writer desires to express his appreciation and enjoyment of the cordial relations which have always existed between him and the Trustees of the District, officially and personally, and his obligation to them for many courtesies shown him. He believes that these harmonious relations, which have extended also to the engineer corps, and the active personal interest of the several members of the Board in the work, have added materially to its success. He would also express his obligations to the Superintendent, Mr. Albert S. Hall, and the other employes of the District for friendly assistance and cooperation in the work, and his great indebtedness to the resident engineer, Mr. William T. Barnes, and the other members of the engineer corps, to whose devotion and untiring interest the successful conduct of the work was largely due.

Respectfully submitted,

LEONARD METCALF,

Consulting Civil Engineer.

February 22, 1906.

Appendixes

APPENDIX A

Kennebec Water District. Pipe Ordered of R. D. Wood & Co. (June 29, 1904)

Size.	Class.	Lin. Feet.	Weight per ft. lbs.	Weight per length.	No. of lengths.	Weight in Tons. (2,000 lbs.) Normal.	Wt. with 2% added.
24 in.	Flexible joint..	240	295.83	3,550*	20	35.50	36.21
24 in.	E	1,020	250.00	3,000	85	127.50	130.05
24 in.	C	5,400	212.50	2,550	450	573.75	585.22
24 in.	Light	14,400	195.83	2,350	1,200	1,410.00	1,438.20
20 in.	Flexible joint..	480	258.00	3,095*	40	61.90	63.14
20 in.	E	720	188.33	2,260	60	67.80	69.16
20 in.	C	22,308	160.00	1,920	1,859	1,786.64	1,822.37
12 in.	B	204	71.25	855	17	7.27	7.41
10 in.	B	708	56.66	680	59	20.06	20.46
8 in.	C	108	44.17	530	9	2.38	2.43
6 in.	C	804	29.17	350	67	11.72	11.95
4 in.	C	204	17.92	215	17	1.83	1.87
		46,596	.....	.....	3,883	4,106.35	4,188.47
	Specials	.....	.....	.....	95 pcs.	50.0	51.0
	Total tonnage.	.....	.....	.....	.....	4,156.35	4,239.47

PRICES.

	Tons (2,000 lbs.) Normal Wt.	With 2% added.	Rate per ton.	Estimated Cost. Normal Wt.	With 2% added.
Flexible	97.4	99.4	$31.00	$3,019.40	$3,081.40
24 and 20 inch.....	3,965.7	4,045.0	22.80	90,417.96	92,226.00
12, 10, 8 and 6 inch ...	41.4	42.3	23.00	952.20	972.90
4 inch	1.8	1.9	24.30	43.74	46.17
Specials	50.0	51.	50.00	2,500.00	2,550.00
Flanges (each).....	32 pcs.	–	2.00	64.00	64.00
				$96,997.30	$98,940.47

* Actual.

APPENDIX B

Kennebec Water District. Summary of Pipe Received 1904

	Total Shipped, Lbs.		Damaged, Lbs.		Net Weight, Lbs.	
	Str. Pipe.	Specials.	Str. Pipe.	Specials.	Str. Pipe.	Specials.
Schooners:						
Daisy Farlin	1,195,006		4,836		1,190,170	
Maine	522,033	775	1,060		520,973	775
John Paul	1,145,971	18,393	7,517	1,249	1,138,454	17,144
M. M. Ford	947,450		2,862		944,588	
Millville	820,515	52,885	2,194		818,321	52,885
M. A. Hall	1,103,934		5,265		1,098,669	
L. B. Ellems	553,008		3,380		549,628	
S. B. Hubbard	972,384	14,913	3,218		969,166	14,913
All rail	292,743	26,186			292,743	26,186
Total from R. D. Wood						
Lbs	7,553,044	113,152	30,332	1,249	7,522,712	111,903
Tons	3,776.5	56.6	15.2	0.6	3,761.3	56.0
From Warren Foundry.						
Schooners:						
I. B. Ellems	174,994		1,070		173,924	
M. B. Roper	723,199		6,380		716,819	
Total from Warren Fdy.						
Lbs	898,193		7,450		890,743	
Tons	449.1		3.7		445.4	
Grand total pipe bought						
Tons	4,225.6	56.6	18.9	0.6	4,206.7	56.0

Note:—In addition to the above some pipe and several specials were purchased locally for emergency use on the line, principally from the following:

Metropolitan Water & Sewerage Board,	Boston, Mass.
Lumsden & Van Stone Co.,	Boston, Mass.
Portland Co.,	Portland, Maine.
Builders Iron Foundry,	Providence, R. I.
Davis & Farnum,	Waltham, Mass.

APPENDIX C

Kennebec Water District. Summary of Cost of Pipe, Season of 1904

Foundry.	Tons—2,000 Lbs.			Rate.	Cost.		
	Shipped.	Condemned.	Accepted.		As per Bills.	Condemned.	Paid.
R. D. Wood & Co.							
Schooner	81.584	0.137	81.477	$31 00	$2,529.10	$4.26	$2,524.84
Schooner	1.901		1.901	24 30	46 19		46.19
Schooner	39.508	0.238	39.270	23 00	908 38	5.47	902.91
Schooner	3,507.157	14.778	3,492.369	22 80	79,963.19	337.17	79,626.02
By rail	114.051		114.051	22 80	2,600 37		2,600.37
By rail	15.380		15.380	31 00	476.76		476.76
By rail	16.941		16.941	23 00	389.64		389.64
R. D. Wood totals Straight Pipe	3,776.522	15.163	3,761.359		$86,913.63	$346 90	$86,566.73
Warren Foundry	449.096	3.725	445.371	23.00	10,329.22	85 67	10,243.55
Total straight pipe	4,225.618	18.888	4,206.730		$97,242.85	$432.57	$96,810 28
R. D. Wood Specials	56.576	0.625	55.951	2 ½	2,828.74	31.23	2,797.51
Totals	4,282,194	19.513	4,262.681		$100,071.59	$463 80	$99,607.79

Note:—In addition to the above, some pipe and several specials were purchased locally for emergency use on the line, principally from the following:

Metropolitan Water and Sewerage Board, Boston.		
Lumsden & Van Stone Co., Boston,	1,940 lbs. @ 3 ½ c..	$67.90
	7,779 lbs. @ 1 ½ c.	
Portland Co., Portland,, Maine.	Freight. $25.23%	141 91
Builders Iron Foundry, Providence, R. I.		
Davis & Farnum, Waltham, Mass.		

APPENDIX E

Kennebec Water District. Final Location of Gates and Specials on China Lake Pipe Line

On 20 Inch Line.	20x20x20 inch Inspect. Tee.	Air Valve with Inspect. Tee.	Blow-off.	20 inch Valve.	Reducer.	Piezometer
On 20 inch line				1 + 19	1—12	0 + 89 (Venturi Meter.)
"	1+16					
"		10—01	7+02=6"			
"	14—96		14+92=6"			
"		19+94				
"			22—44=8"			
"		35+96				
"	41—01					
"			50—85=8"			
"		57—03				
"	62—47			62+45		
"	71+08		71+11=6"			
"	77+38	77—33		77—35		
"			81—04=6"			
"	90—31		90+13=12"			
"		105—84				
"				108—51		
"			111—18=6"			
"						117+60
"		127+56				127+30
"			131—82=12"			
"	147—25					
"	170+16					
"	187+25					
"	199—28			199+32		
"		214—04				
"	230+39					
"		End of 20" Line			235+0	
Total on 20 inch line.	12	8	9	5	2	2
On 24 inch line	243+33		243—37=12"	243+28	243+28	
"		265+74				
"			268+54=12"			
"	275—54			275+58	275+58	
"						277+98
"	282+63					
"						290—92
"	292+95		318—12=6"			
"		312+52				
"		329+42	338+03=6"			
"		348—95	352—93=10"			
"				362+12	362+12	
"	362+07					
"	379+02					
"		394+05				
"			398+02=4"			
"		405—38				
"			409+24=8"			
"	414+69	414—74=12"	Plugged Tee			
"	418+89	Gate	House at Sta.	438+25		
Total on 24 inch line.	8	6	7	3	3 Prs.	2

APPENDIX F

Proposals opened July 12 1904 for constructing the China Lake Pipe Line and appurtenances for Kennebec Water District Waterville Me.

Leonard Metcalf Supervising Engr
H Benson Engr. Bolton Mass.

Item	Description	Quantities	T.F. Ruggles Chelsea Mass. Item	T.F. Ruggles Amt	L.N. Farnum Boston Mass. Item	L.N. Farnum Amt	Jones & Hedlund Boston Mass. Item	Jones & Hedlund Amt	D.J. Sheehan Lynn Mass. Item	D.J. Sheehan Amt	C.N. Taylor Wellesley Mass. Item	C.N. Taylor Amt	E.M. Stacey Waterville Me. Item	E.M. Stacey Amt
a	Earth excavation, 0-7 ft. in depth, outside of trench lines	300 cu. yds	.47	141	.35	105	.50	150	.40	120	.50	150	.20	60
b	Earth excavation, 7-14 ft. in depth, including pipe trenching	3,500 " "	.70	2450	.80	2800	.50	1750	.85	2975	.80	2800	.75	2625
c	Earth excavation, 14-20 ft. in depth, including pipe trenching	600 " "	.95	570	1.15	690	1.00	600	1.25	750	1.50	900	1.50	900
d	Earth excavation, 20-26 ft. in depth, including pipe trenching	100 " "	1.20	120	1.70	170	1.25	125	2.00	200	2.00	200	2.00	200
e	Borrowpit excavation,	500 " "	.40	200	.40	200	.50	250	.45	225	.50	250	.50	250
f	Rock excavation 0-7 ft. in depth,	1,000 " "	4.50	4500	3.50	3500	1.62	1620	3.00	3000	4.00	4000	5.00	5000
g	Rock excavation 7-14 ft. in depth,	1,000 " "	6.50	6500	5.50	5500	2.62	2620	5.00	5000	6.00	6000	10.00	10000
h	Rock excavation 14-20 ft in depth,	500 " "	8.00	4000	7.50	3750	3.50	1750	7.00	3500	10.00	5000	16.00	8000
i	Rock excavation 20-26 ft in depth,	100 " "	18.00	1800	19.50	1950	4.00	400	10.00	1000	15.00	1500	20.00	2000
j	Additional haul. Amount uncertain; probably small													
k	24-inch lake intake pipe-laying,	560 lin. ft.	21.00	11760	15.80	8848	9.50	5320	14.00	7840	18.00	10080	10.86	6432
l	24-inch pipe mill pond crossings,	700 " "	6.00	4200	3.80	2660	5.00	3500	1.50	1050	10.00	7000	4.45	3115
m	Remaining 24-inch pipe-laying,	19,740 " "	1.35	26649	.90	17766	1.10	21714	.77	15199.80	.90	17766	.86	16976
n	20-inch pipe river crossings,	1,160 " "	8.00	9440	6.50	7540	8.00	9280	4.00	4640	12.00	13920	20.00	23200
o	Remaining 20-inch pipe-laying,	22,500 " "	1.15	25875	.80	18,000	.90	20250	.70	15750	.80	18,000	.96	21582.50
p	16-inch pipe-laying,	100 " "	1.00	100.	.55	55	.66	66	.38	38	.70	70	.75	75
q	12-inch pipe-laying,	200 " "	.85	170	.40	80	.55	110	.50	100	.50	100	.45	90
r	10-inch pipe-laying,	100 " "	.80	80	.35	35	.50	50	.46	46	.40	40	.36	36
s	8-inch pipe-laying,	100 " "	.75	75	.30	30	.45	45	.40	40	.30	30	.25	25
t	6-inch pipe-laying,	200 " "	.70	140	.25	50	.40	80	.38	76	.27	54	.22	44
u	4-inch pipe-laying,	200 " "	.60	120	.25	50	.35	70	.35	70	.25	50	.18	36
v	Drain pipe laying,	200 " "	.75	150	.25	50	.35	70	.38	76	.30	60	.25	50
w	Portland cement concrete,	200 " "	4.50	900	5.00	1000	5.00	1000	5.00	1000	6.00	1200	4.00	800
x	Brick masonry laid in Portland cement mortar,	100 " "	11.00	1100	10.00	1000	12.00	1200	14.00	1400	9.80	980	11.70	1170
y	Rubble stone masonry laid in Portland cement mortar,	150 " "	5.00	750	5.00	750	5.50	825	4.50	675	7.00	1050	6.00	900
z	Gate-house superstructure,		600	600	825	825	300	300	800	800	900	900	800	800
aa	Sheeting to be left in place. None anticipated													
bb	B.M. assumed	20 M.	25.00	500	20.	400	30.	600	35	700	40.	800	20.	400
	TOTALS			103190		76504		75424		65690.80		85120		105472.50

No Check-mills was-one

APPENDIX G

Kennebec Water District, Waterville, Me., Jan. 5, 1905. Estimate of Labor Performed and Material Furnished under Contract No. 3, by Loring N. Farnum, Contractor for the Construction of the China Lake Pipe Line. Estimate No. 5a. Work done to Jan. 4, '05, 10 P. M.

	Classification.	Unit.	Rate.	Quantities.	Amounts.	Totals.
	Earth Excavation.					
a.	Outside Trench 0'-7'	cu. yd.	0.35	594	$207.90	
b.	Including Trench 7'-14'	" "	0.80	3,226	2,580.80	
c.	Including Trench 14'-20'	" "	1.15	456	524.40	
d.	Including Trench 20'-26'	" "	1.70	7	11.90	
e.	Borrowed Earth		0.40			$3,325.00
	Rock.					
f.	Excavation 0'-7'	" "	3.50	1,356	4,746.00	
g.	Excavation 7'-14'	" "	5.50	633	3,481.50	
h.	Excavation 14'-20'	" "	7.50	263	1,972.50	
i.	Excavation 20'-26'	" "	12.50	3	37.50	10,237.50
j.	Excess Haul	200 ft.	0.02			
	Pipe Laying.					
k.	Intake 24" pipe	lin. ft.	15.80	257	4,060.60	
l.	Mill Pond Cr. 24" pipe	" "	3.80	424	1,611.20	
m.	All Other 24" Pipe	" "	0.90	18,474	16,626.60	
n.	River Crossings 20" Pipe	" "	6.50	1,000	6,500.00	
o.	All Other 20" Pipe	" "	0.80	21,804	17,443.20	
	Allowance on Pipe Hauling	" "				200.00
q.	12" Pipe	" "	0.40	90	36.00	
r.	10" Pipe	" "	0.35	15	5.25	
s.	8" Pipe	" "	0.30	68	20.40	
t.	6" Pipe	" "	0.25	150	37.50	
u.	4" Pipe	" "	0.25			
v.	Drain Pipe 12"	" "	.40	96	38.40	
	6"	" "	0.25	44	11.00	46,390.15
	Masonry.					
w.	Portland Concrete	cu. yd.	5.00	29	145.00	
x.	Brick	" "	10.00	97	970.00	
y.	Rubble	" "	5.00	42	210.00	1,325.00
z.	Gate House Superstructure	Unit.	225.			
aa.	Sheeting and bracing left in place by order	M.	15.			
bb.	Timber in place	M.	20.			
cc.	Extra Work	cost—15%				874.49
						$62,352.14
	15% retained					9,352.82
						$52,999.32
	Less Previous payments.					
	Fourth Estimate				46,348.55	
	Payment on account				5,000.00	51,348.55
	Amount due					$1,650.77

APPENDIX H

Kennebec Water District, Waterville, Me., Jan. 5, 1905
Balance of Work Remaining to Be Done, China Lake Pipe Line

Classification.	Unit.	Rate.	Quantities.	Amounts.	Totals.
Earth Excavation.					
a. Outside Trench 0′–7′	cu. yd.	0.35	21	$7.35	
b. Including Trench 7′–14′	" "	0.80	554	443.20	
c. Including Trench 14–20	" "	1.15	143	164.45	
d. Including Trench 20–26	" "	1.70	0		
e. Borrowed Earth	" "	0.40	200	80.00	$695.00
Rock.					
f. Excavation 0′–7′	" "	3.50	142	497.00	
g. Excavation 7′–14′	" "	5.50	420	2,310.00	
h. Excavation 14′–20′	" "	7.50	126	945.00	
i. Excavation 20′–26′	" "	12.50	0		3,752.00
j. Excess haul	200 ft.	0.02	0		
Pipe Laying.					
k. Intake 24″ pipe	lin. ft.	15.80	303	4,787.40	
l. Mill Pond Cr. 24″ pipe	" "	3.80	270	1,026.00	
m. All Other 24″ pipe	" "	0.90	1,317	1,185.30	
n. River Crossings 20″ pipe	" "	6.50	120	780.00	
o. All Other 20″ pipe	" "	0.80	430	344.00	
p. 16″ pipe	" "	0.55			
q. 12″ pipe	" "	0.40	30	12.00	
r. 10″ pipe	" "	0.35	12	4.20	
s. 8″ pipe	" "	0.30	12	3.60	
t. 6″ pipe	" "	0.25	40	10.00	
u. 4″ pipe	" "	0.25			
v. Drain Pipe	" "	0.25			8,152.50
Masonry.					
w. Portland Concrete	cu. yd.	5.00	12	60.00	
x. Brick	" "	10.00	8	80.00	
y. Rubble	" "	5.00	60	300.00	
z. Gate House Superstructure	unit	225.00		225.00	665.00
aa. Sheeting and bracing left in place by order	M.	15.			
bb. Timber in place	M.	20.			
cc. Extra Work	cost—15%				250.00
					$13,514.50

APPENDIX I

Kennebec Water District, Waterville, Me., July 31, 1905. Final Estimate of Labor Performed and Material Furnished Under Contract No. 3, By Loring N. Farnum, Contractor, for the Construction of the China Lake Pipe Line

Classification.	Unit.	Rate.	Quantities.	Amounts.	Totals.
Earth Excavation.					
a. Outside Trench 0–7′	cu. yd.	0.35	662	$231.70	
b. Including Trench 7′–14′	" "	0.80	3,953	3,162.40	
c. Including Trench 14–20	" "	1.15	631	725.65	
d. Including Trench 20–26	" "	1.70	7	11.90	
e. Borrowed Earth	" "	0.40			$4,131.65
Rock.					
f. Excavation 0′–7′	" "	3.50	1,533	5,365.50	
g. Excavation 7′–14′	" "	5.50	1,223	6,726.50	
h. Excavation 14′–20′	" "	7.50	462	3,465.00	
i. Excavation 20′–26′	" "	12.50	9	112.50	15,669.50
j. Excess Haul	200 ft.	0.02			
Pipe Laying.					
k. Intake 24" pipe	lin. ft.	15.80	558	8,816.40	
l. Mill Pond Cr. 24" pipe	" "	3.80	694	2,637.20	
m. All Other 24" pipe	" "	0.90	19,738	17,764.20	
n. River Crossings 20" pipe	" "	6.50	1,119	7,273.50	
o. All Other 20" pipe	" "	0.80	22,238	17,790.40	
p. 16" pipe	" "	0.55			
q. 12" pipe	" "	0.40	133	53.20	
r. 10" pipe	" "	0.35	27	9.45	
s. 8" pipe	" "	0.30	80	24.00	
t. 6" pipe	" "	0.25	179	44.75	
u. 12" Drain	" "	0.40	96	38.40	
v. Drain pipe	" "	0.25	44	11.00	54,462.50
Masonry.					
w. Portland Concrete	cu. yd.	5.00	31	155.00	
x. Brick	" "	10.00	109	1,090.00	
y. Rubble	" "	5.00	105	525.00	1,770.00
z. Gate House Superstructure	unit	225.			225.00
aa. Sheeting and bracing left in place by order	M.	15.			
bb. Timber in place	M.	20.	0.2	4.00	4.00
cc. Extra Work	cost+15%				1,243.64
Less Previous Payments Prior to Jan. 4, 1905					$77,506.29 51,348.55
Balance					$26,157.74

APPENDIX K

Kennebec Water District. Reinforcement and Extension of Distribution Pipe System. 1905

Size of Pipe.	Amount Laid. Feet.
16 inch	2,267
14 inch	1,852
12 inch	26,763
10 inch	6,271
10 inch (River Crossing)	260
8 inch	14,505
6 inch	3,915
Total	55,813
Old pipe removed	12,845
Net extension	42,968

APPENDIX L

Canvass of Bids for Cast Iron Pipe and Specials for Kennebec Water District, Waterville, Maine. Opened March 23, 1905, at Office of Leonard Metcalf, Supervising Engineer

Foundry.	New England Water Works Weights, Net.					New England Water Works Weights, 2% included.				
	Specials f. o. b. Waterville, 42 tons.		C. I. Pipe, f. o. b. Waterville, 1,511 tons.		Total.	Specials f. o. b. Waterville, 48 tons.		C. I. Pipe f. o. b. Waterville, 1,595 tons.		Total.
	Price.	Total.	Price.	Total.		Price.	Total.	Price.	Total.	
Warren Foundry and Machine Co.	2-7/8c.	$2,415.00	$29.75	$44,952.25	$47,367.25	2-7/8c.	$2,472.50	$29.75	$47,451.25	$49,923.75 [1]
U. S. C. I. P. and Foundry Co.	1.52c.	1,278.90	30.45	46,009.95	47,288.85	1.52c.	1,309.35	30.45	48,567.75	49,877.10 [2]
			8" & 10"					8" & 10"	47,724.27	50,089.27 [3]
Donaldson Iron Co.	2-3/4c.	2,310.00	30.25	11,358.88				30.25		
			12" 14" & 16"			2-3/4c.	2,365.00	12" 14" & 16"		
			29.80	33,837.90	47,506.78			29.80		
				$45,196.78						
Chas. Millar & Son	2-1/2c.	2,100.00	27.80	42,005.80	44,105.80	2-1/2c.	2,150.00	27.80	44,341.00	46,491.00 [4]
M. J. Drummond	2.83c.	2,377.20	30.00	45,330.00	47,707.20	2.83c.	2,433.80	30.00	47,850.00	50,283.80 [5]
Builders Iron Foundry	3.16c.	1,895.00	Lump bid at Builders Iron Foundry Weights							[6]
Davis & Farnum	2.9c.	1,952.19	At D. & F. Weights.							[7]

[1] First shipment in 5 to 7 weeks. Complete order in 4 months. Prices open till April 1st.
[2] Agree to make shipment subject to prior sale of space; limit weight of specials to 50 net tons.
[3] 8" and 10" in June, 12" begin on latter part of July and complete in 10 weeks: 14" in April: 16" in July: tapping extra.
[4] Unable to guarantee complete delivery before September.
[5] 400 tons in 30 days if advised promptly: balance within 3 months or less after order placed.
[6] Ship almost entire order from stock.
[7] Agree to make deliveries as specified.

APPENDIX M

Kennebec Water District. Cast Iron Pipe Supplied by the Warren Foundry and Machine Co. 1905

Size.	Class.	Tons—2,000 lbs.			Rate.	Cost.		
		Shipped.	Condemned.	Accepted.		As per Bills.	Condemned.	Paid.
16 inch	C	153.569	.....	153.569	$29.75	$4,568.68	.....	$4,568.68
14 inch	B	83.316	1.080	82.236	29.75	2,478.65	$32.13	2,446.52
12 inch	B	936.221	7.275	928.946	29.75	27,852.57	216.43	27,636.14
10 inch	B	178.964	0.680	178.284	29.75	5,324.18	20.23	5,303.95
Wards 10 inch	.....	10.782	.....	10.782	35.00	377.37	.....	377.37
8 inch	C	265.725	0.802	264.923	29.75	7,905.31	23.86	7,881.45
Specials	.....	56.830	0.879	55.951	27½	3,267.72	50.54	3,217.18
		1.938	.....	1.938	49½	184.11	.....	184.11
		1,674.125	10.716	1,663.409		$51,958.59	$343.19	$51,615.40

APPENDIX N

Kennebec Water District, Waterville, Me., Contract No. 20. Reinforcement and Extension of Distribution Pipe System. Proposals Opened 10 A. M., April 29, 1905, for Laying Cast Iron Water Pipe and Appurtenances in Waterville, Winslow, Fairfield and Benton, Maine

Item.	Description.	Quantities.	Boylston Construction Co.		Horace Purinton Co.		Nichols-Magee Construction Co.	
			Item.	Amount.	Item.	Amount.	Item.	Amount.
a	Earth excavation 0–7 ft. in depth outside of trench lines: amount uncertain; very small	$0.25 per cu. yd.						
b	Amount earth excavation 7–14 ft. in depth, including pipe trench: amount uncertain; very small	$0.60 per cu. yd.						
c	Rock excavation 0–7 ft. in depth	1,000 cu. yds.	$4.00	$4,000.00	$4.00	$4,000.00	$6.00	$6,000.00
d	Rock excavation 7–14 ft. in depth	50 cu. yds.	6.00	300.00	8.00	400.00	10.00	500.00
e	Additional haul—amount uncertain; very small	$0.02 per cu. yd.						
f	12 inch pipe-laying over the Waterville and Winslow bridge, including boxing, etc	560 lin. ft.	2.65	1,484.00	3.50	1,960.00	.62	347.20
g	8 inch pipe-laying over the Fairfield and Benton bridge, including boxing, etc	840 lin. ft.	2.45	2,058.00	(290 dbl.) 2.40	2,016.00	.62	520.80
h	10 inch flexible joint, pipe-laying under Sebasticook river	260 lin. ft.	12.50	3,250.00	15.00	3,900.00	25.00 or extra.	6,500.00
i	16 inch pipe-laying	2,500 lin. ft.	.71	1,775.00	.80	2,000.00	.62	1,550.00
j	14 inch pipe-laying	1,900 lin. ft.	.55	1,045.00	.75	1,425.00	.62	1,178.00
k	12 inch pipe-laying	27,000 lin. ft.	.38	10,260.00	.58	15,660.00	.62	16,740.00
l	10 inch pipe-laying	4,000 lin. ft.	.35	1,400.00	.49	1,960.00	.62	2,480.00
m	8 inch pipe-laying	19,000 lin. ft.	.29	5,510.00	.40	7,600.00	.62	11,780.00
n	6 inch pipe-laying	2,300 lin. ft.	.25	575.00	.35	805.00	.62	1,426.00
o	Taking old pipe out of trench and removing to points required	15,000 lin. ft.	.20	3,000.00	.17	2,550.00	.20	3,000.00
p	Reconnecting old services to new pipe	650 lin. ft.	2.00	1,300.00	1.85	1,202.50	5.00	3,250.00
q	Setting hydrants on new pipe line, number uncertain: from 15-40	$2.00 per hydr.						
r	Taking up and relaying granite block paving along pipe lines	800 lin. ft.	.30	240.00	.90	720.00	.30	240.00
s	Portland cement concrete	50 cu. yds.	10.00	500.00	10.00	500.00	6.00	300.00
t	Brick masonry laid in Portland cement, mortar, none anticipated	$8.00 per cu. yd.						
u	Rubble stone masonry laid in Portland cement mortar, none anticipated	$5.00 per cu. yd.						
v	Sheeting to be left in place, none anticipated	$15.00 per M.						
w	Extra work							
	Totals			$36,697.00		$46,698.50		$55,812.00

APPENDIX O

Kennebec Water District, Waterville, Maine, November 1, 1905. Final Estimate of Labor Performed and Materials Furnished Under Contract No. 20, by the Boylston Construction Company, Contractors for the Reinforcement and Extension of the Distribution Pipe System

Classification.	Unit.	Rate.	Quantities.	Amounts.	Totals.
a. Earth Excavation 0-7	cu. yd.	$0.25	466	$116.50	
b. Earth Excavation 7-14	" "	0.60	100	60.00	$176.50
c. Rock Excavation 0-7	" "	4.00	1,423	5,692.00	
d. Rock Excavation 7-14	" "	6.00	13.5	81.00	5,773.00
e. Additional Haul	" "	0.02			
f. 12 inch pipe Bridge Crossings	lin. ft.	2.65			
g. 8 inch pipe Bridge Crossings	" "	2.45			
h. 10 inch pipe River Crossings	" "	12.50	260	3,250.00	
i. 16 inch pipe laying	" "	0.71	2,267	1,609.57	
j. 14 inch pipe laying	" "	0.55	1,832	1,007.60	
k. 12 inch pipe laying	" "	0.38	26,763	10,169.94	
l. 10 inch pipe laying	" "	0.35	6,271	2,194.85	
m. 8 inch pipe laying	" "	0.29	14,505	4,206.45	
n. 6 inch pipe laying	" "	0.25	3,915	978.75	23,417.16
o. Taking up old pipe	" "	0.20	12,845	2,569.00	
p. Reconnecting old services	each	2.00	293	586.00	
q. Setting Hydrants new pipe	each	2.00	7	14.00	
r. Taking up and relaying granite block paving	lin. ft.	0.30	613	183.90	3,352.90
s. Portland Cement Concrete	cu. yd.	10.00	8.5	85.00	
t. Brick Masonry	" "	8.00			
u. Rubble stone masonry	" "	5.00			
v. Sheeting left in place	M. b. m.	15.00			
x. Extra Trench outside old trench	lin. ft.	0.20	940	188.00	273.00
w. Extra Work					1,445.14
Total					$34,437.70
Allowance by K. W. D. for maintaining house connections					500.00
Total Amount Contract Work					$34,937.70
Amount retained for repairs § p. page 51 (3%)				$1,033.13	
Less Previous Payments				27,221.80	
Total Deductions					28,254.93
Amount Due					$6,682.77

APPENDIX P

Kennebec Water District. Canvass of Bids for Furnishing Fire Hydrants. 1905

Items.	No.	Chapman Valve Mfg. Co.		Coffin Valve Co.		Ludlow Valve Mfg. Co.	
		Price.	Amount.	Price.	Amount.	Price.	Amount.
5" Hydrants with two 2½" nozzles and one steamer nozzle, without frost cases	23	$29.25	$672.75	$28.75	$661.25	$30.15	$693.45
6" Hydrants with three independently gated 2-½" nozzles and one steamer nozzle, without frost cases	2	49.20	98.40	59.00	118.00	49.35	98.70
Total			$771.15		$779.25		$792.15

APPENDIX Q

Kennebec Water District. Approximate Estimate—Cost of Construction & Maintenance of Water Works System for North Vassalboro, Maine

3,100 ft. 12 in. C. I. pipe laid @	$1.30	$4,030.00
3,200 ft. 8 in. C. I. pipe laid @	0.80	2,560.00
4,000 ft. 6 in. C. I. pipe laid @	0.60	2,400.00
500 cu. yds. Rock excavation @	4.00	2,000.00
Standpipe		3,000.00
Pump—500,000 gals. capacity		1,750.00
Gas Engine—15 H. P.		900.00
Gas Engine—25 H. P.		1,600.00
Pumping Station, complete		760.00
Hydrants—12 in place		500.00
		$19,500.00
Engineering and Contingencies		3,500.00
		$23,000.00

MAINTENANCE PER YEAR.

Engineman	$350.00
Gasoline, oil, etc.	400.00
Superintendent and Clerk	75.00
Repairs, etc	175.00
Total, per year	$1,000.00
Interest on $23,000.00 @ 4½%	1,035.00
Sinking Fund, bonds 30 year 3½%	430.50
Necessary Gross Earnings	$2,465.50

STATISTICS ON VILLAGE OF NORTH VASSALBORO, MAINE.

122 Houses (50 owned by American Woolen Co.)

148 Families.

716 Inhabitants.

SUPERINTENDENT'S REPORT

To the Honorable Board of Trustees of the Kennebec Water District.

Gentlemen:

As your Superintendent, I respectfully submit the following report, covering a period of two and one-half years, from November 1, 1903, to April 30, 1906.

At the time of your taking of the plant from the Maine Water Company, November 1, 1903, there were 1,942 services of various sizes, distributed as follows:—in Waterville, 1,447; Fairfield, 382; Benton, 52, and Winslow, 61; supplied with water by means of about twenty-nine miles of mains, and producing a gross revenue, the first six months,—Nov. 1, 1903 to May 1, 1904,—of $21,168.46. During the cold period from Nov. 1, 1903 to May 1, 1904, but little could be done in the way of new service work. There were, however, ten services added in Waterville and one in Fairfield.

The winter of 1903-4 was unusually severe, the extreme cold weather causing the ground to freeze to a depth of five and six feet in many instances,—stopping the service in the small pipes, causing much annoyance to customers, and expense of thawing and repairing. The rain-fall during the summer, fall and winter of 1903 was very light as compared with former years. That, with the unusually heavy draft upon the lakes above your dam, during the summer and fall months, brought us into the winter with a decreased supply for power purposes in the Messalonskee stream. Our dam

was leaking approximately twelve per cent. of that. We had at that time no auxiliary steam pump with which to supply the deficient power to produce the 1,950,000 gallons daily average consumption of water. We were compelled to secure the aid of the Hollingsworth & Whitney Company to supply the shortage by means of one of their steam pumps, at an expense to us of two dollars an hour, as follows:

December, 1903	301 3-4	hours
January, 1904	598	"
February, 1904	586	"
March, 1904	29	"

The precipitation, as water, during these four months was: December 2.98; January 2.58; February 1.51, and March 3.41 inches, but the larger part of this was held in the form of snow and ice, and did not find its way into the lakes and stream until the warmer months of spring; after which time, we did our own pumping, without aid.

In March, 1904, began the preparation of plans for securing for our consumers an ample supply of water, of unquestioned purity,—a supply that was absolutely safe for drinking, as well as nearly perfect for any and all other purposes required by an ideal water supply. Such a supply was found at China lake. You began at once maturing plans to secure this supply,—the working out of which appears in the full report of the engineer in charge of the work, Mr. Leonard Metcalf of Boston, which is a part of this general report. That our people appreciated your efforts to secure for them a good supply of pure water is shown by the fact, that as soon as the frost was out of the ground, an unusually large demand was made on us for new services, by people who had heretofore clung to "Grandfather's well" for their water supply.

The fiscal year beginning May 1, 1904, was marked by a steadily growing list of new consumers. There were added 51 services in Waterville, 11 in Fairfield, and 2 in Benton. During the year we pumped 697,680,508 gallons of water,—an average of 1,911,453 gallons per day. The gross assessment for water for the year was $44,676.81. Abatement on account of non-use was $730.04.

The precipitation, as water, for the year May 1, 1904 to April 30, 1905, was 33.21 inches; the first six months 22.32, the last six months 10.89. The greatest fall was in September, 1904, 5.84; the least in March, 1905, 0.83.

The first of May, 1905, saw the waters of China lake flowing into our new well at the pumping stations—by gravity. After testing the line thoroughly, under a pressure of one hundred pounds, and finding the line satisfactory, the pipe was cleansed, and May 15, 1905, began pumping water from the new supply in earnest; since which time the flow has been constant, not stopping for an hour; nor has one drop of water from any other source passed into the system. All pipes leading from the pumps to the Messalonskee were closed absolutely tight and, we believe, will never be opened again.

After pumping into the system from the new supply for a week, we began to cleanse the mains, by pumping in the new water and flushing out the old. The reservoir was emptied and cleansed and everything possible done to secure a clean and wholesome water supply for our consumers. Here again, was made apparent the appreciation of your efforts, by the people of the city and towns in which your plant is located. During the season we added 141 new services, as follows: 65 in Waterville, 33 in Fairfield, 30 in Winslow, 12 in North Vassalboro, and 1 in Benton. Many more services were requested, but could not be put in on account of the lateness of the season. We also installed 8 new hydrants in Waterville and 9 new ones in Winslow.

Since the dam was repaired last fall and No. 2 pump, we have had no need to pump by steam until February 28. On that day, at nine o'clock in the morning, both water power pumps were stopped by anchor ice and were both down for hours,—No. 1 for 11 1-2 hours and No. 2 for 9 3-4 hours. Had it not been for the new steam pump, we would have been without fire protection during that time, but with the steam pump, we would have been able to take care of any kind of a fire that might have started.

The frost has been slow in coming out of the ground this spring, which has delayed service work; although there is a

large demand for new services, and we have added several the last month. We now have (May 1st) in Waterville 1,574, Fairfield 427, Winslow 93, Benton 55, and North Vassalboro 12.

The gross assessment for the year ending April 30, 1906, was 46,237.35. The abatement on account of vacancies was 586.51,—an unusually small amount for that period. There are some 2,500 feet of extensions to our mains asked for, and are now under advisement.

There have been less than the usual number of leaks in mains and services this spring, which shows an improved condition in the plant; the pumps are working perfectly; the dam is almost absolutely tight, and the general physical condition of the plant is excellent. Many of our consumers are adding fixtures to those already installed, and the demand for new services is each day increasing our number of patrons rapidly.

The precipitation as water for the past year, taken from the records of the Hollingsworth & Whitney Co., by the courtesy of Mr. Dean, was 32.87 inches, or .34 inches less than the previous year.

The within report is respectfully submitted,

ALBERT S. HALL,
Superintendent.

TREASURER'S REPORT

KENNEBEC WATER DISTRICT

To the Board of Trustees:—

Your treasurer begs respectfully to present herewith a report of the financial operations of the District from the date of its first transaction on August 3rd, 1899, to the close of business on April 30th, 1906.

The results shown in this report are compiled from the various periodical reports hitherto made to you by your treasurer; and they are intended to exhibit in a form appropriate to the present purpose all material facts relating to these operations.

GENERAL OUTLINE

The period covered by this report may conveniently be divided into three subordinate periods representing successive stages in the financial history of the District, as follows:

First Period

August 3rd, 1899—April 30th, 1904

During this period the financial operations of the District were for the most part engaged in establishing the constitutionality of the Act of Incorporation; in preparing and presenting the District's case before the appraisers; in arranging

for payment for the Plant, Property and Franchises of the Maine Water Company; and in some preliminary work looking to the introduction of water from a new source of supply.

The course and results of the operations of this first period are shown in the following statements and schedules representing conditions existing at the close of business on April 30th, 1904.

Balance Sheet, Assets & Liabilities, April 30th, 1904. Page 138.

Cash Statement, Receipts & Disbursements, August 3rd, 1899 —April 30th, 1904. Pages 139-44.

Schedule A., Notes Payable, Outstanding April 30th, 1904. Page 168.

Second Period

May 1st, 1904—April 30th, 1905

During this period the financial operations of the District were of a broader scope than during the first period. Payment in full for the Plant, Property and Franchises of the Maine Water Company was completed and the operation of the business taken over; the construction of a Pipe Line from China Lake, with an auxiliary steam plant and other appropriate improvements, was taken up and carried well along toward completion; and at the close of the period arrangements were made for the sale of the District's bonds and the funding of its debt upon a permanent basis.

The course and the results of the operations of this second period are shown in the following statements and schedules representing conditions existing at the close of business on April 30th, 1905.

Balance Sheet, Assets & Liabilities, April 30th, 1905. Pages 138-9.

Cash Statement, Receipts & Disbursements, May 1st, 1904—April 30th, 1905. Pages 145-56.

Schedule B., Notes Payable, Outstanding April 30th, 1905. Page 169.

Schedule D., Net Cost of Acquisition, April 30th, 1905. Pages 170-1.

Earnings & Expenses, Current Operations, May 10th, 1904—April 30th, 1905. Page 167.

Schedule F., Operating Expense, May 10th, 1904—April 30th, 1905. Page 173.

Third Period

May 1st, 1905—April 30th, 1906

During this period the District's bonds were issued and all outstanding notes were taken up; the Pipe Line from China lake was completed and other construction in connection with the New Supply was correspondingly advanced; the reinforcement of the Street Mains System was practically completed; and the policy of continuing the general betterment of the plant was carried forward in various directions.

The course and the results of the operations of this third period are shown in the following statements and schedules representing conditions existing at the close of business on April 30th, 1906.

Balance Sheet, Assets & Liabilities, April 30th, 1906. Page 139.

Cash Statement, Receipts & Disbursements, May 1st, 1905—April 30th, 1906. Pages 157-67.

Schedule C., Bonds, Outstanding April 30th, 1906. Page 169.

Schedule E., Plant, Property & Franchises, April 30, 1906. Page 171.

Schedule E., (1) Street Mains, April 30th, 1906. Pages 171-2.

Schedule E., (2) New Supply, April 30th, 1906. Pages 172-3.

Earnings & Expenses, Current Operations, May 1st, 1905—April 30th, 1906. Page 168.

Schedule G., Operating Expense, May 1st, 1905—April 30th, 1906. Page 174.

PRELIMINARY FINANCES

Up to the time when the first installment of the District's bonds was delivered to the purchaser on May 9th, 1905, its requirements on capital account had been supplied by the proceeds of notes issued from time to time, as occasion required, and designated for convenience as of the First and Second Series.

Notes of the First Series

These notes were issued at various dates between August 3rd, 1899, and April 30th, 1904, and the amount of them outstanding on that date was $289,500.00, as shown, with details, in Schedule A, on page 168.

The notes shown in this Schedule all bore interest at the rate of 5 per cent. per annum, with the exception of one note for $2,500.00, made under a prior agreement at 4 per cent., and they came to maturity at various dates between May 5th and October 28th, 1904.

The gradual growth of the indebtedness of the District, from its inception on August 3rd, 1899, is shown in the following table giving the amount of notes outstanding on April 30th of each year prior to 1904:

April	30th,	1900	$ 250.00
"	"	1901	350.00
"	"	1902	350.00
"	"	1903	6,400.00

A comparison of these results with the Cash Statement for the period ending on April 30th, 1904, on pages 139-44 shows that the District's borrowings did not go materially beyond the requirements for immediate expenditure until, in December, 1903, preparations began to be made for the necessary payments to the Maine Water Company.

The proceeds of subsequent obligations enabled the District to pay all these notes of the First Series, and they were therefore taken up and cancelled as they matured.

Notes of the Second Series

As a result of somewhat extended inquiry among various financial institutions it became evident, early in the year 1904, that the District could not borrow within the state sufficient money, at a satisfactory rate, to enable it to take over the plant and property of the Maine Water Company and to carry out the plans of the trustees for the introduction of water from a new source of supply. It was also believed, after careful consideration of the condition of the money market elsewhere, that the time was not favorable for selling the District's bonds and funding its indebtedness upon a permanent basis, and therefore arrangements were concluded on April 29, 1904, with Messrs. F. S. Moseley & Company of Boston providing for the sale, at ¼ of one per cent. commission, of $800,000.00 of notes of a Second Series bearing interest at the rate of 4¾ per cent. per annum and maturing at the National Shawmut Bank of Boston on May 1st, 1905.

These notes were issued in amounts and at times as specified in Schedule B. on page 169, and in addition a temporary loan of $5,000 was made on April 8th, 1905, to provide for immediate requirements pending the funding of the District's debt.

Such of these notes as were issued prior to November 1st, 1904, called for a payment of interest at the end of six months as well as at maturity, and these payments were effected by means of a transfer of funds from the Ticonic National Bank to the place of payment at the National Shawmut Bank of Boston as shown in the Cash Statements.

These notes were all paid between May 6th and 10th, 1905, such of them as matured on May 1st having been carried by the National Shawmut Bank of Boston for the account of the District at 4 per cent. while the Bond issue was being prepared for delivery.

BOND ISSUE

On April 12th, 1905, in response to a widely published announcement, competitive bids were received for the purchase of $950,000 of the District's 3½ per cent. bonds, to bear date May 1st, 1905, and to mature at the National Shawmut Bank of Boston in amounts and upon dates as follows:

$ 50,000 on May 1st, 1910.
$100,000 on May 1st, 1915.
$150,000 on May 1st, 1920.
$650,000 on May 1st, 1925.

Messrs. Lee, Higginson & Company of Boston were the highest bidders for these bonds, and a sale of the whole issue was therefore made to them at the following prices:

$ 50,000 due May 1st, 1910, 99.35 and interest,
$100,000 due May 1st, 1915, 98.80 and interest,
$150,000 due May 1st, 1920, 98.30 and interest,
$650,000 due May 1st, 1925, 97.91 and interest,

the average price for the whole issue being 98.14 and interest.

It was subsequently agreed that the purchaser should take and pay for $850,000 of these bonds as soon after May 1st, 1905, as they could be got ready for delivery, and the remaining $100,000 at such later dates as the requirements of the District might indicate.

In pursuance of this agreement, the first delivery of these bonds was made on May 9th, 1905, and subsequent deliveries as shown in Schedule C. on page 169.

By means of this issue of bonds the District was enabled to convert its entire floating debt into a funded debt of a permanent character; to complete the construction work required in connection with the New Supply system and the reinforcement of the Street Mains; and to carry forward other betterments of the plant indicated by the requirements of the service.

The price at which these bonds were sold showed a discount below their par value of $17,660 on the whole issue, and

this discount is carried in the Balance Sheet of April 30th, 1906, as a nominal asset awaiting other appropriate disposition.

ACQUISITION FROM THE MAINE WATER COMPANY

The proceeds of the obligations represented by the notes of the First Series outstanding on April 30th, 1904, had enabled the District to pay the Legal, Engineering, Bacteriological and Sundry Expenses and all interest charges incurred since the beginning of operations, amounting on that date to $47,445.40, and to pay the Maine Water Company $220,000.00 on account of the purchase of the property.

The issue of notes of the Second Series to the amount of $300,000.00 under date of May 2nd, 1904, put the District in a position to close this account, and a final payment of $283,-955.47 was therefore made on May 9th, 1904, making a total of $503,955.47 paid to the Maine Water Company in full.

The entire cost to the District, as of April 30th, 1905, of the Plant, Property and Franchises acquired from the Maine Water Company was $556,814.52 as shown in the Balance Sheet of that date and in detail in Schedule D. on pages 170-1.

The final settlement with the Company on May 9th, 1904, included the following elements of entire cost shown in detail in Schedule D.

Appraiser's Award	$503,475.37	
Interest on ditto	15,859.47	
Mesne Charges	9,808.80	$529,143.64
Interest Credits	$ 2,108.04	
Mesne Credits	23,080.13	25,188.17
Total paid Maine Water Company,		$503,955.47

The Mesne Charges and Credits appearing in the account with the Maine Water Company originated in the operation of the business by that Company in behalf of the District

from the time when the award became effective on November 1st, 1903, to the time when the property was turned over to the District upon final payment on May 9th, 1904. It was deemed appropriate to regard these operations as accruing for the account of the Cost of Acquisition, and to regard the District's operation of the business as beginning on the date of final acquisition.

From the above figures it is apparent that the cost on April 30th, 1905, of the property acquired from the Maine Water Company exceeded the payments completed on May 9th, 1904, by the sum of $52,859.05. This cost in excess of the amount paid the Maine Water Company is made up of the remaining items in Schedule D as follows:

Expenses	$47,084.75		
Interest Charge	5,201.72		
Sundry Charge	1,448.43	$53,734.90	
Interest Credits	$ 582.55		
Sundry Credits ...	293.30	875.85	$52,859.05

BETTERMENTS OF PLANT

Immediately after the final acquisition of the property of the Maine Water Company the construction of the Pipe Line from China lake and of an extensive addition to the Pumping Station, together with the installation of an auxiliary steam plant, was taken up and carried actively forward and resulted, on April 30th, 1905, in a total of $252,154.42 charged to the New Supply Account. Other construction in the nature of Betterments called for $3,893.22 during that year, making a total of $256,047.64 expended in new construction up to April 30th, 1905, as shown in the Balance Sheet of that date on page 138.

During the following year the work in connection with the New Supply was practically completed at an additional cost of $15,254.01; the extension and reinforcement of the system

of Street Mains was carried forward at a cost of $98,924.99; and other work in betterment of the plant was done at a cost of $5,245.05, making a total outlay of $119,424.05 for the improvement of the property during the year ending April 30th, 1906.

The course of this construction work during the two years which have elapsed since the plant came into the possession of the District is shown in the following table giving the net amount charged to Betterments during each one of these years:

April 30th, 1905	$256,047.64	
April 30th, 1906	119,424.05	$375,471.69

The details, of which the entire amount thus charged to Betterments consists, are shown in Schedule E, on page 171 under the appropriate titles.

The reinforcement and extension of the Street Mains system and the installation of the New Supply system form so important a part of the improvements made during these two years that the cost of each, to April 30th, 1906, has been arranged under separate heads and is shown in Schedules E. (1) and E. (2) on pages 171-3 in such detail as seems appropriate to the present purpose.

PLANT, PROPERTY AND FRANCHISES

On April 30th, 1906, the Plant, Property and Franchises account in which merely the Cost of Acquisition had previously been carried, was charged with the additional cost of all Betterments made since the property was acquired. It was also credited with certain deductions representing material on hand on May 10th, 1904, and the proceeds of the sale of old iron, etc., included in the property acquired at that time. The result shows that the net cost to the District of its entire Plant, Property and Franchises as of April 30th, 1906, was $931,779.53 as appears in the Balance Sheet of that date and in Schedule E, on page 171.

The transfer of these charges for Betterments to the Plant, Property and Franchises account signalizes the practical completion of the work laid out in connection with the New Supply system and with the reinforcement of the Street Mains, and marks the close of a period of extraordinary development in the constructive work of the District. These charges were held in their original accounts, until the close of this period in order that the full extent of improvement might be made more clearly apparent by the simultaneous transfer of a total of $375,471.69 representing the growth of the plant at its various points of development.

EARNINGS AND EXPENSES

The long established custom of the Maine Water Company in billing its charges being closely in correspondence with the date of final acquisition, it was decided that the first fiscal year should embrace the twelve months from May 1st, 1904 to April 30th, 1905, inclusive, and the system of accounting was therefore arranged to correspond with that division.

The Statements of Earnings and Expenses on pages 167-8 are intended to show all earnings and all charges pertaining to the Income Account—or, in other words, relating to the operation of the business—from the date of final acquisition on May 10th, 1904, to April 30th, 1906. It will be noted that the results to April 30th, 1905, are for a period which falls short by nine days of being a full fiscal year, and are subject to a corresponding modification, so far as Gross Earnings and Operating Expense are concerned, when used in comparison with the results of other years. In making such comparisons therefore the following additions will be made to the figures showing the Earnings and Expenses from May 10th, 1904 to April 30th, 1905.

Gross Earnings,	add 9 days.....	$879.27
Abatements,	add 9 days.....	29.53
Operating Expense,	add 9 days.....	101.30

It is perhaps appropriate to point out that the Statements of Earnings and Expenses are not intended to correspond with the cash receipts and disbursements on Income Account during the two years now under consideration. This is because Gross Earnings represent credits (corresponding to charges to customers' accounts receivable), and Operating Expense and deductions for Interest represent charges (corresponding to credits to accounts payable) which have accrued with respect to these periods, without regard to the amount of cash that may actually have been received and paid out on account of these credits and charges.

Gross Earnings

The following table shows the Gross Water Rates, the Abatements and the Net Water Rates for each one of the two full years ending on April 30th, 1906, with the increases and decreases:

	Gross Water Rates.	Abatements.	Net Water Rates.
April 30th, 1905,	$44,676.81	$731.69	$43,945.12
April 30th, 1906,	46,237.35	586.51	45,650.84
Increase,	$ 1,560.54	$145.18 (dec.)	$ 1,705.72

The abatements deducted from the Gross Water Rates are in the nature of discounts allowed upon vouchers signed by the customer for reasons satisfactory to the Superintendent having knowledge of the facts.

Operating Expense

The Operating Expense for the year ending April 30th, 1906, amounted to $12,878.89 as against $8,902.45 for the entire twelve months ending April 30th, 1905, showing an increase of $3,976.44.

The amounts charged to the various accounts making up Operating Expense are shown in detail in Schedules F. and G.

on pages 173-4. The classification there shown was adopted after consultation with expert accountants having an extended experience in work of that character, and is believed to follow the practice which has the approval of well-established usage.

An examination of these accounts shows that the increase over the previous year is due to a variety of causes of which the following may be specified as being of principal effect:

(a) The fact that the cost of operating and maintaining, at its full efficiency, a plant which has been enlarged and improved to the extent of $375,000.00 must of necessity be greater than it was before such enlargement was made.

(b) The fact that, in carrying out the general policy of improving the plant at all points, various items of labor, material and equipment have been charged to the operating accounts to an extent probably beyond the mere requirements of maintenance.

(c) The fact that $1,235.00 has been charged to Sundry Expense for printing the District's bonds and for the compensation of the Auditor and the Treasurer with respect to a period prior to the beginning of the fiscal year on May 1st, 1905.

It is of course obvious that the Operating Expense Accounts will be of much greater value for the purposes of comparison after the work of construction has been finished and the current operations have been brought into a system requiring each year's income to bear only those charges which properly pertain to it.

Interest Charges

The charges for Interest appear in the Statements of Earnings and Expenses as Deductions from Total Income.

The Deductions for April 30th, 1905, represent the interest accrued from May 10th, 1904, to April 30th, 1905, inclusive on all notes outstanding during that period; and the brokerage at ¼ of one per cent. on the entire amount of Notes of the Second Series issued between May 2nd, 1904, and February 1st, 1905, no attempt having been made to apportion this brokerage for the period from May 2nd to May 10th, 1904.

The Deductions for April 30th, 1906, represent the interest accrued from May 1st, 1905, to April 30th, 1906, on $950,000.00 3½ per cent. bonds less the interest accrued thereon from May 1st, 1905, to the various dates of delivery and paid by the purchaser under his contract; the interest accrued from May 1st, 1905, to maturity on the temporary loan of $5,000.00 included among the Notes of the Second Series; and the net charge to carry in the National Shawmut Bank the Notes of the Second Series for $800,000.00 from their maturity on May 1st, 1905, until the proceeds of the first installment of bonds became available to pay these notes in full.

The Deductions of April 30th, 1906, were less than those of April 30th, 1905, by the sum of $2,782.13, notwithstanding the fact that the interest-bearing debt was $145,000.00 larger on the latter date than it was on the former. This favorable result is, of course, due to the fact that the debt was carried at a lower rate of interest during the last year.

It is worthy of note that the earnings of the business have carried the interest on the entire debt since the property was acquired on May 9th, 1904, no part of the interest accruing since that date having been charged to construction accounts.

Net Income

The net result of the operation of the business from May 10th, 1904, to April 30th, 1906, inclusive is shown in the following table:

April 30th, 1905, deficit	$ 43.28
April 30th, 1906, surplus	717.87
Net surplus	$674.59

In view of the fact that the large outlays for Betterments during the last two years could not reasonably be expected to result at once in a corresponding increase in the earnings, the gain represented by these figures may be considered satisfactory. The steady advance in the earnings of the business during many years before it came into the hands of the District affords strong assurance of greater gain in the future.

SUNDRIES

The relation of certain items in the Balance Sheets on pages 138-9 to the general plan which has been followed in the foregoing parts of this report may perhaps be made more clearly apparent by a few words of further explanation.

The charge to the Plant, Property and Franchises Account in the Balance Sheet of April 30th, 1905, represents the net cost of acquisition, as shown in Schedule D. on page 171, and in the Balance Sheet of April 30th, 1906, represents the sum of the net cost of acquisition and of the net cost of betterments as shown in Schedule E. on page 171.

The charge to Accounts Receivable in the Balance Sheets of April 30th, 1905 and 1906, include all unpaid bills for water and for labor and materials charged to customers with respect to service connections.

The Fuel and General Stock on hand and the Office Furniture and Fixtures are not regarded as a part of the permanent investment in the plant, and their cost therefore is not included in the Plant, Property and Franchises, but is carried in separate accounts in the Balance Sheets of April 30th, 1905 and 1906.

The credits to Accounts Payable in the Balance Sheets of April 30th., 1905 and 1906 include unpaid vouchers which had at that time been audited and approved by the trustees and charged to the appropriate accounts in accordance with the custom usually followed in the accounting of private corporations. They include also, in the Balance Sheet of April 30th, 1905, an item of $19,000.00 received from Messrs. Lee, Higginson & Company on April 12th, 1905, representing 2 per cent. of the par value of the District's bonds for which they were bidders. Their bid being the highest, this sum was held as a credit on account of their purchase.

The credit for Interest on Notes in the Balance Sheet of April 30th, 1905, represents the interest accrued to that date inclusive, but not then due and payable, on all the notes then outstanding.

The credit for Interest Accrued on Bonds in the Balance

Sheet of April 30th, 1906, represents the interest for six months to that date inclusive, due and payable on May 1st, 1906, on the entire bonded debt, the interest for the prior six months having been paid on November 1st, 1905.

The Cash Statements on pages 139-67 show in detail all the receipts and disbursements of cash from the date of the first transaction on August 3rd, 1899, to April 30th, 1906, inclusive, and the balances of cash on hand on April 30th, 1904, 1905 and 1906, corresponding to the amounts shown in the Balance Sheets of those dates. These receipts and disbursements were credited and charged to the appropriate accounts in the usual course of the business operations of the District. It did not appear practicable to indicate in these statements the distribution of each item and therefore only names are employed for identification. All of these cash transactions are of course embodied under their appropriate heads in the statements and schedules which present the results of the District's operations for the period covered by this report.

GEORGE K. BOUTELLE, Treasurer.

Waterville, Maine, June 9th, 1906.

STATEMENTS AND SCHEDULES

Balance Sheet

April 30th, 1904

ASSETS

Maine Water Company,			
Payments on Account		$220,000.00	
Accounts Receivable		130.10	
Expense Accounts,			
Legal Expense	$37,086.64		
Engineering Expense	4,070.38		
Bacteriological Expense	3,351.28		
Sundry Expense	2,380.74	46,889.04	
Interest Account,			
Payments to date		556.36	
Cash		21,924.50	$289,500.00

LIABILITIES

Notes Payable,			
Schedule A		$289,500.00	$289,500.00

Balance Sheet

April 30th, 1905

ASSETS

Plant, Property and Franchises		$556,814.52	
Betterments,			
Buildings and Fixtures	$24.73		
Dams, Hydrants, etc	6.88		
Steam Plant	12.50		
Station Machinery, etc	12.50		
Street Mains	3,539.37		
City Hydrants	45.21		
Meters	78.70		
New Services	173.33		
New Supply	252,154.42	256,047.64	
Cash		25,929.32	
Accounts Receivable		2,116.77	
Fuel and General Stock		926.88	
Office Furniture and Fixtures		1,385.75	
Deficit on Income Account		43.28	$843,264.16

LIABILITIES

Notes Payable, Schedule B		$805,000.00	
Accounts Payable,			
Audited Vouchers	$4,433.63		
Lee, Higginson & Co.	19,000.00	23,433.63	
Interest on Notes, Accrued to date		14,830.53	$843,264.16

Balance Sheet

April 30th, 1906

ASSETS

Plant, Property and Franchises	$931,779.53	
Discount on Bonds	17,660.00	
Cash	13,480.06	
Accounts Receivable	2,304.54	
Unexpired Insurance,	154.96	
Fuel and General Stock	1,240.36	
Office Furniture and Fixtures	1,440.65	$968,060.10

LIABILITIES

Bonded Debt, Schedule C	$950,000.00	
Accounts Payable, Audited Vouchers	760.51	
Interest Accrued on Bonds	16,625.00	
Surplus	674.59	$968,060.10

Cash Statement

August 3, 1899—April 30, 1904

RECEIPTS

1899		
Aug. 3	Ticonic National Bank	$250.00
1900		
Sep. 17	Ticonic National Bank	100.00
1902		
May 27	Waterville Savings Bank	3,500.00
July 31	Ticonic National Bank	500.00

1903		
Feb. 13	Ticonic National Bank	
Mar. 10	Swan & Barrett	$1,000.00
Mar. 14	Ticonic National Bank	5,000.00
Apr. 16	Ticonic National Bank	13.78
May 20	Ticonic National Bank	1,150.00
June 8	Ticonic National Bank	400.00
July 8	Ticonic National Bank	300.00
July 24	Swan & Barrett	450.00
Aug. 6	Ticonic National Bank	2,500.00
Sep. 9	Ticonic National Bank	600.00
Sep. 16	Harvey D. Eaton	600.00
Sep. 28	Augusta Water District	50.00
Oct. 19	Portland Trust Co.	12.00
Nov. 7	Waterville Savings Bank	2,500.00
Dec. 1	Belfast Savings Bank	2,000.00
1904		100,000.00
Jan. 23	Waterville Savings Bank	
Feb. 3	Belfast Savings Bank	10,000.00
Feb. 5	Androscoggin Co. Savings Bank	100,000.00
Feb. 15	Waterville Savings Bank	10,000.00
Mar. 3	Ticonic National Bank	10,000.00
Mar. 17	F. C. Thayer	453.64
Mar. 18	Fairfield Savings Bank	154.04
Mar. 22	Portland Savings Bank	10,000.00
Apr. 8	Gardiner Savings Bank	25,000.00
Apr. 28	Ticonic National Bank	10,000.00
		10,000.00
	Total, April 30, 1904	$306,533.46

Cash Statement

August 3, 1899—April 30, 1904.

DISBURSEMENTS

1899		
Aug. 3	A. H. Plaisted, Cashier	$5.00
Aug. 3	Harvey D. Eaton	100.00
Aug. 3	George K. Boutelle	13.06
Aug. 24	George K. Boutelle	2.00
Aug. 24	Storey, Thorndike & Palmer	25.00
Dec. 5	A. H. Plaisted, Cashier	5.00
1900		
Apr. 7	A. H. Plaisted, Cashier	5.00
Aug. 8	A. H. Plaisted, Cashier	5.00
Sep. 17	A. H. Plaisted, Cashier	2.00
Sep. 17	George K. Boutelle	.02
Sep. 17	W. S. Choate	79.00
Sep. 17	J. A. Hayden	12.00
Dec. 10	A. H. Plaisted, Cashier	5.00

1901

Jan. 31	Hascall S. Hall, Cashier	$2.00
Apr. 12	Hascall S. Hall, Cashier	5.00
June 8	Hascall S. Hall, Cashier	2.00
June 8	Chas. E. Nash	54.60
Aug. 14	Hascall S. Hall, Cashier	5.00
Oct. 9	Hascall S. Hall, Cashier	2.00
Dec. 16	Hascall S. Hall, Cashier	5.00

1902

Jan. 15	Hascall S. Hall, Cashier	2.00
Apr. 4	Hascall S. Hall, Cashier	5.00
May 27	Orville D. Baker	2,500.00
May 28	Hascall S. Hall, Cashier	100.17
May 28	Mail Publishing Co	2.75
June 13	Ira A. Mitchell	18.00
June 13	Burleigh & Flynt	21.00
June 13	H. E. Judkins	87.02
July 1	Willard M. Dunn, P. M	10.60
July 18	New England Water Works Ass'n	6.50
July 31	Hascall S. Hall, Cashier	8.33
July 31	William A. Hill	1,015.00
Aug. 6	Hascall S. Hall, Cashier	5.00
Aug. 7	William C. Hawker & Co	2.45
Aug. 7	F. E. Engelhardt	100.00
Aug. 7	Maine Water Company	10.00
Nov. 28	Waterville Savings Bank	87.50
Dec. 10	Hascall S. Hall, Cashier	15.00
Dec. 10	Mail Publishing Co	.75

1903

Feb. 4	New England Water Works Ass'n	3.00
Feb. 13	Hascall S. Hall, Cashier	16.67
Feb. 13	A. S. Page	16.00
Feb. 13	Mail Publishing Co	3.50
Feb. 13	Eugene Strong	6.00
Feb. 13	George C. Whipple	192.50
Feb. 13	Edward C. Marcia	32.07
Feb. 13	Charles E. Nash	35.00
Feb. 13	Harvey D. Eaton	27.17
Feb. 13	Whitall Tatum Company	84.47
Feb. 13	Elmer & Amend	43.28
Mar. 14	B. P. Wells	5.19
Mar. 14	Harvey D. Eaton	2.30
Mar. 14	Emil Greiner	9.48
Mar. 14	George C. Whipple	231.50
Mar. 14	A. S. Page	43.00
Mar. 14	Wardwell Brothers	2.33
Mar. 14	Eugene W. Strong	14.25
Mar. 14	John Ware	47.27
Mar. 14	Elmer & Amend	14.15
Mar. 14	E. C. Levy	11.06
Mar. 14	E. C. Levy	.50
Mar. 14	Hascall S. Hall, Cashier	1,500.00
Mar. 14	Everett R. Drummond, Treas	3,551.04
Apr. 10	Eugene W. Strong	18.00

Apr.	16	Hascall S. Hall, Cashier	$4.16
Apr.	16	Ezra R. Thayer	1,000.00
Apr.	16	Arthur S. Page	30.00
Apr.	16	Mail Publishing Co.	3.75
Apr.	16	George C. Whipple	200.00
Apr.	16	Eimer & Amend	7.08
Apr.	16	E. C. Levy	13.70
Apr.	29	Maine Water Co.	1.75
May	18	Eugene W. Strong	14.50
May	20	Messalonskee Electric Co.	5.00
May	20	Bausch & Lomb Optical Co.	8.32
May	20	Thos. W. Burr Printing & Advertising Co.	16.25
May	20	H. E. Judkins	17.75
May	20	George C. Whipple	229.75
May	20	Storey, Thorndike, Palmer & Thayer	12.99
May	20	E. C. Levy	8.41
May	20	Alden & Deehan	19.60
June	8	William C. Hawker & Co.	14.07
June	8	Harry E. Green	35.90
June	8	E. C. Wilson	15.90
June	8	George C. Whipple	200.75
June	8	Eugene W. Strong	16.00
June	8	Messalonskee Electric Co.	17.37
June	8	Maine Water Co.	1.75
June	8	E. C. Levy	9.60
June	20	Hascall S. Hall, Cashier	11.25
June	24	Swan & Barrett	61.67
July	8	A. W. Totman	8.00
July	8	Edward G. Stacey	7.00
July	8	Harry E. Green	96.00
July	8	E. C. Wilson	40.40
July	8	Messalonskee Electric Co.	2.00
July	8	Eugene W. Strong	22.00
July	8	Maxime Turmelle	6.75
July	8	E. C. Levy	11.55
July	28	Hascall S. Hall, Cashier	2,514.36
Aug.	6	Maine Water Co.	1.75
Aug.	6	Arnold W. Totman	27.05
Aug.	6	Bert A. Butler	5.00
Aug.	6	Messalonskee Electric Co.	9.16
Aug.	6	Harry E. Green	156.45
Aug.	6	E. C. Wilson	56.85
Aug.	6	George C. Whipple	432.88
Aug.	6	Eugene W. Strong	20.00
Aug.	6	Edward G. Stacey	26.75
Aug.	6	E. C. Levy	7.90
Sep.	5	E. C. Wilson	70.45
Sep.	8	Arnold W. Totman	38.30
Sep.	8	William Hayes	2.00
Sep.	9	Eimer & Amend	9.00
Sep.	9	Jesse A. Richards	2.00
Sep.	9	Emil Greiner	12.88
Sep.	9	Alden & Deehan	2.80
Sep.	9	A. L. Hinds	1.00
Sep.	9	E. C. Levy	15.52
		Eugene W. Strong	30.00

Sep.	9	Harry E. Green	$137.55
Sep.	9	Edward G. Stacey	32.55
Sep.	9	George C. Whipple	243.95
Sep.	11	Harvey D. Eaton	50.00
Sep.	17	W. T. Reynolds	42.00
Sep.	17	Day & Smiley	11.56
Sep.	29	C. O. Barrows	35.00
Oct.	14	George K. Boutelle	50.00
Oct.	20	Philip I. Robinson	7.00
Oct.	20	Messalonskee Electric Co	6.00
Oct.	20	C. O. Barrows	86.03
Oct.	20	Arnold W. Totman	11.62
Oct.	20	Eugene W. Strong	26.00
Oct.	20	Harry E. Green	137.13
Oct.	20	E. C. Wilson	41.45
Oct.	20	George C. Whipple	308.00
Oct.	20	Edward G. Stacey	12.59
Oct.	20	H. E. Judkins	203.13
Oct.	20	John D. Neal	10.50
Oct.	20	Harold E. Stacy	9.36
Oct.	20	E. C. Levy	60.75
Oct.	20	Harvey D. Eaton	50.00
Oct.	20	Portland Trust Co	50.00
Oct.	20	Hascall S. Hall, Cashier	12.14
Oct.	20	Hascall S. Hall, Cashier	1,250.00
Oct.	20	John F. Nash	35.40
Oct.	28	Harvey D. Eaton	75.00
Nov.	7	M. B. Smith	15.10
Nov.	7	A. M. & H. Redington	23.00
Nov.	7	Leonard Metcalf	791.73
Nov.	7	Edward G. Stacey	3.10
Nov.	7	Eugene W. Strong	22.00
Nov.	7	Harry E. Green	145.32
Nov.	7	J. L. Dean	1.50
Nov.	7	Gorham Dana	22.00
Nov.	7	Merchants National Bank	13.95
Nov.	7	Freeman C. Coffin	585.94
Nov.	7	H. E. Judkins	359.00
Nov.	10	George K. Boutelle	25.00
Nov.	14	Western Union Telegraph Co	5.67
Nov.	20	Postal Telegraph Co	1.41
Dec.	9	John W. Alvord	1,156.17
Dec.	9	Hanson, Webber & Dunham	131.74
Dec.	9	J. S Estes	892.56
Dec.	9	W. T. Reynolds	149.50
Dec.	9	Storey, Thorndike, Palmer & Thayer	5,039.71
Dec.	9	Fred S. Brown	3.86
Dec.	9	John R. Freeman	767.11
Dec.	9	William R. Hill	1,094.80
Dec.	9	E. A. W. Hammatt	15.20
Dec.	9	Messalonskee Electric Co	3.00
Dec.	10	Alden & Deehan	1.40
Dec.	10	William C. Hawker & Co	8.73
Dec.	10	Ira A. Mitchell	36.00
Dec.	10	Silas G. Small	92.00
Dec.	10	James L. Dean	1.65

Dec.	10	Maine Water Co.	$1.75
Dec.	10	Harry E. Green	30.65
Dec.	17	Eugene W. Strong	12.50
Dec.	17	Silas G. Small	3.00
Dec.	17	John C. Moore	18.50
Dec.	17	W. T. Reynolds	8.50
Dec.	17	Messalonskee Electric Co.	3.00
Dec.	17	William R. Hill	300.00
Dec.	17	George K. Boutelle	1,500.00
Dec.	17	George C. Whipple	549.66
Dec.	17	Willard M. Dunn, P. M.	10.90
1904			
Jan.	4	F. C. Thayer	86.00
Jan.	4	Walter S. Wyman	98.00
Jan.	4	Virgil R. Connor	92.00
Jan.	4	Stephen A. Nye	74.00
Jan.	4	Ira E. Getchell	60.00
Jan.	18	Harvey D. Eaton	20,000.00
Jan.	20	Ira A. Mitchell	9.50
Jan.	20	Eugene W. Strong	8.75
Jan.	20	Harry E. Green	14.08
Jan.	20	Edward G. Stacey	1.88
Jan.	20	H. E. Judkins	10.00
Jan.	20	A. M. & H. Redington	1.40
Jan.	20	Mail Publishing Co.	1.75
Jan.	20	John H. Burleigh	65.55
Jan.	20	Day & Smiley	7.97
Jan.	20	N. E. Water Works Ass'n.	15.00
Feb.	5	Maine Water Company	1.75
Feb.	8	W. M. Dunn, P. M.	3.00
Feb.	12	N. E. Water Works Ass'n	20.00
Feb.	20	George K. Boutelle	25.00
Feb.	25	Percy M. Blake	686.52
Feb.	25	Frederick A. Powers	697.32
Feb.	25	Frederick H. Appleton	651.88
Feb.	27	R. Dana Small	223.14
Feb.	27	J. S. Butterfield	9.00
Mar.	4	William H. Quimby	34.00
Mar.	4	F. E. Timberlake	40.00
Mar.	4	Maine Trust & Banking Co.	170,000.00
Mar.	7	F. C. Thayer	500.00
Mar.	10	Hascall S. Hall, Cashier	5,138.33
Mar.	18	Fairfield Savings Bank	250.00
Mar.	26	Maine Trust & Banking Co.	50,000.00
Apr.	4	F. C. Thayer	25.00
Apr.	4	S. L. Preble	1.77
Apr.	11	Harry E. Green	7.00
Apr.	16	V. R. Connor	304.00
Apr.	19	Hascall S. Hall, Cashier	2,500.00
Apr.	28	Hascall S. Hall, Cashier	250.00
Apr.	30	Balance, Cash on hand	21,924.50
		Total, April 30, 1904	$306,533.46

Cash Statement

May 1, 1904—April 30, 1905

RECEIPTS

1904			
May	1	Balance from previous statement	$21,924.50
May	2	F. S. Moseley & Co	300,000.00
June	1	F. S. Moseley & Co	100,000.00
June	1	Collections	3,677.53
July	1	F. S. Moseley & Co	50,000.00
July	11	Collections	2,582.41
Aug.	1	F. S. Moseley & Co	100,000.00
Aug.	2	Collections	3,152.48
Aug.	4	Augusta Water District	433.03
Aug.	26	F. C. Thayer	4.39
Sep.	2	F. S. Moseley & Co	75,000.00
Sep.	2	Collections	6,408.11
Sep.	20	Portland Savings Bank	6.94
Oct.	1	F. S. Moseley & Co	25,000.00
Oct.	3	Collections	2,608.38
Oct.	31	Collections	1,309.92
Nov.	1	F. S. Moseley & Co	50,000,00
Nov.	23	F. S. Moseley & Co	25,000.00
Dec.	2	Collections	6,218.35
Dec.	2	M. Turmelle	15.00
Dec.	15	F. S. Moseley & Co	25,000.00
Dec.	20	Gilmore & Whipple	1.00
1905			
Jan.	4	W. T. Barnes	104.55
Jan.	4	Collections	2,618.60
Jan.	4	Geo. L. Learned	11.83
Jan.	10	F. S. Moseley & Co	25,000.00
Jan.	31	Collections	2,367.75
Feb.	1	F. S. Moseley & Co	25,000.00
Mar.	4	Collections	6,884.93
Apr.	1	W. A. R. Boothby, State Agent	10.00
Apr.	4	Ticonic National Bank	498.70
Apr.	6	Collections	2,025.43
Apr.	8	Belfast Savings Bank	5,000.00
Apr.	13	Lee, Higginson & Co	19,000.00
Apr.	13	Geo. S. Hewins	1,100.00
Apr.	30	Collections	1,598.17
		Total, April 30, 1905	$889,562.00

Cash Statement

May 1, 1904—April 30, 1905

DISBURSEMENTS

1904			
May	2	F. S. Moseley & Co	$750.00
May	5	Waterville Savings Bank	2,050.00
May	7	J. J. Pray	60.00
May	7	W. B. Getchell	5.65
May	7	Leonard Metcalf	944.25
May	7	Day & Smiley	32.84
May	7	D. U. Clement	3.23
May	7	G. W. Fitzgerald	1.50
May	7	J. L. Labranch	1.15
May	7	The Waterville Iron Works	2.75
May	7	Leonard C. Robinson	42.66
May	7	Ralph H. Rockwood	78.00
May	7	George R. Cook	28.75
May	7	Walter M. Vose	23.75
May	7	Leslie D. Williams	25.00
May	7	B. E. Brann	40.25
May	7	W. B. Arnold & Co	20.39
May	7	Redington & Co	48.67
May	9	A. M. Drummond & Co	45.00
May	9	Chas. W. Jones, Clerk of Sup. Jud. Court	283,955.47
May	9	Charles W. Jones	5.00
May	16	A. S. Hall, Sup't	199.99
May	19	Maine Water Company	92.27
May	23	Thomas Groom & Co	5.00
May	23	George F. Crosby	25.00
May	23	Ira A. Mitchell	11.50
May	23	C. H. Vigue	41.45
May	23	Storey, Thorndike, Palmer & Thayer	1,255.55
May	31	F. S. Moseley & Co	250.00
May	31	A. S. Hall, Sup't	216.81
June	1	Hascall S. Hall, Cashier	102,500.00
June	3	Fish Bros	1.00
June	3	G. W. Fitzgerald	1.17
June	3	A. H. Totman	1.85
June	3	E. C. Marcia	14.52
June	3	F. J. Savage & Co	3.00
June	3	P. H. Plaisted	10.00
June	3	W. L. Blake & Co	4.63
June	3	W. B. Arnold & Co	4.27
June	3	S. A. & A. B. Green	8.00
June	3	Joseph L. Labranch	10.05
June	3	Waterville & Fairfield R'y. & Light Co	6.02
June	3	Sumner & Goodwin Co	40.42
June	4	W. B. Arnold & Co	3.46
June	4	Maine Central Railroad Co	32.12
June	4	Tucker Printing Co	7.25
June	4	Chadwick-Boston Lead Co	8.50

June	4	D. B. Donnelley	$1.65
June	4	P. H. Plaisted	10.00
June	4	Waterville & Fairfield R'y. & Light Co	3.85
June	4	Geo. A. Kennison	47.54
June	4	Waterville Iron Works	3.60
June	4	G. L. Learned & Co	24.55
June	4	A. P. Emery	55.73
June	4	Joseph L. Labranch	8.70
June	4	C. E. Tupper & Co	3.50
June	4	Sumner & Goodwin Co	108.76
June	4	S. A. & A. B. Green	1.00
June	4	B. E. Brann	45.50
June	4	Walter M. Vose	32.50
June	4	George R. Cook	31.25
June	4	Ralph H. Rockwood	90.00
June	4	Leslie D. Williams	36.00
June	4	Leonard C. Robinson	80.00
June	4	George F. Crosby	44.30
June	4	W. S. Bradley	41.00
June	7	Pneumatic Hand Stamp Co	.96
June	8	Harvey D. Eaton	300.00
June	16	A. S. Hall, Sup't	192.00
June	23	Leonard Metcalf	1,115.08
June	30	F. S. Moseley & Co	125.00
June	30	Ralph H. Rockwood	90.00
June	30	Leonard C. Robinson	80.00
June	30	Benj. E. Brann	45.50
June	30	George R. Cook	32.50
June	30	Walter M. Vose	32.50
June	30	Leslie D. Williams	32.50
June	30	George F. Crosby	42.85
July	1	A. S. Hall, Sup't	231.72
July	8	Western Union Telegraph Co	7.85
July	12	A. H. Totman	1.79
July	12	C. E. Tupper & Co	11.45
July	12	Chapman Valve Mfg. Co	13.05
July	12	P. H. Plaisted	10.00
July	12	Mail Publishing Co	2.50
July	12	Sumner & Goodwin Co	19.21
July	12	B. P. Wells, Proprietor	3.00
July	12	Waterville & Fairfield R'y. & Light Co	3.85
July	12	Geo. A. Kennison	18.39
July	12	W. B. Arnold & Co	8.76
July	12	Joseph L. Labranch	5.95
July	12	J. J. Pray	68.00
July	12	Mail Publishing Co	2.50
July	12	Merchants National Bank	9.60
July	13	Harvey D. Eaton	200.00
July	15	A. S. Hall, Sup't	194.75
July	15	C. K. Mathews & Co	53.00
July	20	George K. Boutelle	500.00
July	21	The Engineering News Pub Co	22.80
July	21	The Engineering Record	24.00
July	21	Frederick C. Thayer	78.80
July	21	Leonard Metcalf	1,119.93
July	21	Mail Publishing Co	4.00

July	22	Hascall S. Hall, Cashier	$2,600.00
July	22	Waterville Savings Bank	10,250.00
July	22	F. S. Moseley & Co.	250.00
Aug.	1	A. S. Hall, Sup't.	200.75
Aug.	1	Hascall S. Hall, Cashier	102,500.00
Aug.	2	Frank Chase	100.00
Aug.	2	Hascall S. Hall, Cashier	10,250.00
Aug.	4	Waterville & Fairfield R'y. & Light Co.	3.85
Aug.	4	Joseph L. Labranch	4.25
Aug.	4	D. U. Clement	2.00
Aug.	4	National Meter Co.	35.50
Aug.	4	G. L. Learned & Co.	11.50
Aug.	4	P. H. Plaisted	10.00
Aug.	4	J. L. Parkin & Son	1.06
Aug.	4	Geo. A. Kennison	20.06
Aug.	4	J. H. Cunningham Co.	5.10
Aug.	4	The Sumner & Goodwin Co.	487.27
Aug.	4	Ed. Crager, Prop'r	44.85
Aug.	4	Waterville Sentinel Pub. Co.	68.50
Aug.	4	W. S. Wyman	23.20
Aug.	4	Burleigh & Flynt	5.75
Aug.	4	Day & Smiley	3.52
Aug.	4	W. B. Arnold & Co.	34.39
Aug.	4	William T. Barnes	356.60
Aug.	4	A. S. Hall, Sup't.	36.08
Aug.	5	A. S. Hall, Sup't	1.75
Aug.	13	Hascall S. Hall, Cashier	10,250.00
Aug.	24	J. E. Cates	35.00
Aug.	25	Western Union Telegraph Co.	4.30
Aug.	26	William T. Barnes	200.00
Aug.	26	A. S. Hall, Sup't	195.00
Aug.	26	Maine Central Railroad Co.	227.00
Aug.	26	William T. Barnes	1,664.47
Aug.	26	F. C. Thayer	100.00
Aug.	26	Proctor & Bowie Co.	20.03
Aug.	26	Proctor & Bowie Co.	2.53
Aug.	26	Rensselaer Mfg. Co.	1,650.70
Aug.	26	W. B. Getchell	6.00
Aug.	26	Olin Davies	5.00
Aug.	26	Celia and Mary Hickey	5.00
Aug.	26	Robert Hutton	8.00
Aug.	26	Helen Files	10.00
Aug.	26	Fessenden C. Drummond	25.00
Aug.	26	James P. Taylor	20.00
Aug.	26	C. Wesley Taylor	50.00
Aug.	26	David Hawes	15.50
Aug.	26	Charles C. Hayden	25.00
Aug.	26	Thomas Ballentine	30.00
Aug.	26	Charles Shorey	12.00
Aug.	26	Fred Canham	17.00
Aug.	26	Daniel Tower	25.00
Aug.	26	Sophia G. Webber	25.00
Aug.	30	Maine Central Railroad Co.	155.54
Aug.	30	Alpha Portland Cement Co.	521.66
Aug.	30	Charles Cates	25.00
Aug.	30	Albert and George R. Fuller	50.00
Aug.	30	Horace S. and Jennie P. Howard	5.00

Aug.	30	Albert H. E. Buffum	$30.00
Aug.	30	Samuel Chaffee	25.00
Aug.	30	J. H. Chaffee	30.00
Aug.	30	Hattie Peck	15.00
Aug.	31	F. S. Moseley & Co	187.50
Aug.	31	William T. Barnes	337.30
Sep.	1	A. S. Hall, Sup't	218.87
Sep.	2	A. S. Hall, Sup't	34.66
Sep.	2	A. S. Hall, Sup't	1.75
Sep.	2	Postal-Telegraph Cable Co	2.33
Sep.	8	Loring N. Farnum	5,000.00
Sep.	8	Leonard Metcalf	1,568.93
Sep.	8	National Meter Co	3.70
Sep.	8	P. H. Plaisted	10.00
Sep.	8	Mark T. Claflin	23.15
Sep.	8	Tucker Printing Co	4.00
Sep.	8	Waterville & Fairfield R'y. & Light Co	3.85
Sep.	8	Joseph L. Labranch	6.05
Sep.	8	W. B. Arnold & Co	4.46
Sep.	8	Geo. A. Kennison	26.40
Sep.	8	G. L. Learned & Co	7.11
Sep.	8	The Sumner & Goodwin Co	26.02
Sep.	8	Waterville Iron Works	3.83
Sep.	8	J. O. Peck	5.00
Sep.	8	D. U. Clement	5.90
Sep.	8	W. B. Arnold & Co	16.62
Sep.	15	A. S. Hall, Sup't	198.25
Sep.	15	William T. Barnes	1,750.00
Sep.	15	Maine Central Railroad Co	75.49
Sep.	15	George S. Bush	17.50
Sep.	17	William T. Barnes	853.05
Sep.	17	Hascall S. Hall, Cashier	10,000.00
Sep.	17	F. C. Thayer	100.00
Sep.	17	Hascall S. Hall, Cashier	25,625.00
Sep.	19	Albert Smart	39.52
Sep.	19	John White	10.00
Sep.	23	William T. Barnes	900.00
Sep.	23	William T. Barnes	500.00
Sep.	27	F. S. Moseley & Co	62.50
Sep.	28	F. W. Barry, Beale & Co	10.00
Sep.	28	Metropolitan Water & Sewerage Board	67.90
Sep.	28	Rensselaer Mfg. Co	529.00
Sep.	28	William R. Conard	352.15
Sep.	29	William T. Barnes	250.00
Sep.	30	Maine Central Railroad Co	83.10
Sep.	30	William T. Barnes	427.25
Oct.	1	A. S. Hall, Sup't	202.75
Oct.	1	Frederick C. Thayer	28.00
Oct.	1	Walter S. Wyman	32.00
Oct.	1	Virgil R. Connor	24.00
Oct.	1	Stephen A. Nye	20.00
Oct.	1	Ira E. Getchell	16.00
Oct.	1	Frederick C. Thayer	20.00
Oct.	1	Walter S. Wyman	30.00
Oct.	1	Virgil R. Connor	30.00
Oct.	1	Stephen A. Nye	28.00
Oct.	1	Ira E. Getchell	18.00

Oct.	3	William T. Barnes	$1,700.00
Oct.	3	Postal Telegraph-Cable Co.	.76
Oct.	5	A. S. Hall, Sup't	1.65
Oct.	5	A. S. Hall, Sup't.	20.97
Oct.	6	Hascall S. Hall, Cashier	10,250.00
Oct.	6	Loring N. Farnum	10,176.12
Oct.	7	S. A. Dickinson	7.00
Oct.	7	Ira A. Mitchell.	9.00
Oct.	7	Walworth Mfg. Co.	38.55
Oct.	7	W. B. Arnold & Co.	6.13
Oct.	7	The Sumner & Goodwin Co.	66.44
Oct.	7	P. H. Plaisted	10.00
Oct.	7	Mail Publishing Co.	4.00
Oct.	7	W. T. Reynolds	8.75
Oct.	7	Geo. A. Kennison	21.94
Oct.	7	Chadwick-Boston Lead Co.	52.89
Oct.	7	Geo. S. Ricker & Co.	.64
Oct.	7	Wells Express Co.	6.00
Oct.	7	H. T. Winters	3.72
Oct.	7	Builders Iron Foundry	18.96
Oct.	7	Waterville Iron Works	5.18
Oct.	7	Joseph L. Labranch	10.00
Oct.	7	Hanson, Webber & Dunham	11.00
Oct.	7	Waterville & Fairfield R'y. & Light Co.	3.85
Oct.	7	Mail Publishing Co.	8.25
Oct.	7	New England Tel. & Tel. Co.	9.48
Oct.	7	D. U. Clement	10.40
Oct.	7	W. B. Arnold & Co.	1.00
Oct.	7	Proctor & Bowie Co.	5.36
Oct.	7	William R. Conard	319.98
Oct.	7	R. D. Wood & Co.	40,000.00
Oct.	13	William T. Barnes	800.00
Oct.	14	Loring N. Farnum	6,000.00
Oct.	15	Maine Central R. R. Co.	283.84
Oct.	17	A. S. Hall, Sup't.	212.85
Oct.	20	William T. Barnes	1,800.00
Oct.	25	Albert T. Shurtleff	20.00
Oct.	26	Edson F. Hitchings	25.00
Oct.	26	F. S. Moseley & Co.	125.00
Oct.	26	Olney T. Goddard	30.00
Oct.	28	Hascall S. Hall, Cashier	10,000.00
Oct.	28	Willard M. Dunn, P. M.	10.60
Oct.	28	Fred Pooler	25.00
Oct.	31	Maine Central R. R. Co.	26.56
Nov.	1	Maine Central Railroad Co.	42.30
Nov.	1	A. S. Hall, Sup't	252.75
Nov.	2	William T. Barnes	575.00
Nov.	2	Hascall S. Hall, Cashier	7,125.00
Nov.	2	Postal Telegraph-Cable Co.	.93
Nov.	4	Loring N. Farnum	9,797.33
Nov.	5	A. S. Hall, Sup't.	23.73
Nov.	5	P. H. Plaisted	10.00
Nov.	5	Chapman Valve Mfg. Co.	31.11
Nov.	5	Percy Loud & Sons	8.00
Nov.	5	Hanson, Webber & Dunham	7.60
Nov.	6	Standard Oil Co.	3.15
Nov.	5	Redington & Co.	4.50

Nov.	5	The Sumner & Goodwin Co.	$ .30
Nov.	5	Day & Smiley	36.31
Nov.	5	Lockwood Company	10.80
Nov.	5	Hollingsworth & Whitney Co.	115.00
Nov.	5	Mark T. Claflin	10.80
Nov.	5	Geo. A. Kennison	30.38
Nov.	5	W. B. Arnold & Co.	53.02
Nov.	5	J. L. Labranch	19.25
Nov.	5	S. A. & A. B. Green	2.00
Nov.	5	Waterville & Fairfield R'y. & Light Co.	3.85
Nov.	5	Alden Brothers	35.81
Nov.	5	Diebold Safe & Lock Co.	170.30
Nov.	5	W. W. Berry & Co.	52.71
Nov.	5	Leonard Metcalf	2,027.41
Nov.	5	D. U. Clement	13.50
Nov.	5	W. H. Stobie	6.25
Nov.	5	J. A. Davison	8.45
Nov.	5	Davis & Farnum Mfg. Co.	57.76
Nov.	5	Rensselaer Mfg. Co.	397.00
Nov.	5	Aberthaw Construction Co.	23.53
Nov.	5	W. B. Arnold & Co.	16.15
Nov.	5	Alpha Portland Cement Co.	313.00
Nov.	7	William T. Barnes	300.00
Nov.	9	Loring N. Farnum	6,000.00
Nov.	10	William T. Barnes	100.00
Nov.	11	Kennison & Newell	41.50
Nov.	11	Crescent Printing Co.	19.00
Nov.	11	Warren Foundry & Machine Co.	7,000.00
Nov.	11	Niles & Niles	175.00
Nov.	14	Wells Express	34.75
Nov.	14	A. S. Hall, Sup't	1.75
Nov.	14	Builders Iron Foundry	296.50
Nov.	14	Deane Steam Pump Co.	3,000.00
Nov.	15	Maine Central Railroad Co.	256.48
Nov.	15	American Express Co.	4.65
Nov.	15	William T. Barnes	306.79
Nov.	16	A. S. Hall, Sup't.	248.25
Nov.	16	Maine Central Railroad Co.	133.27
Nov.	17	A. S. Hall, Sup't.	31.38
Nov.	22	F. S. Moseley & Co.	62.50
Nov.	23	R. D. Wood & Co.	35,000.00
Nov.	30	Maine Central Railroad Co.	94.42
Nov.	30	D. F. Paige & Co.	325.00
Dec.	1	Horace Purinton & Co.	5,000.00
Dec.	1	William T. Barnes	430.00
Dec.	1	A. S. Hall, Sup't.	265.85
Dec.	1	Hascall S. Hall, Cashier	2,375.00
Dec.	8	Loring N. Farnum	9,375.10
Dec.	8	C. H. Nelson	15.00
Dec.	9	Harry E. Green	74.25
Dec.	12	F. S. Moseley & Co.	62.50
Dec.	14	A. S. Hall, Sup't.	51.33
Dec.	14	Vigue Harness Co.	22.25
Dec.	14	The Sumner & Goodwin Co.	172.45
Dec.	14	Chapman Valve Mfg. Co.	12.24
Dec.	14	Standard Oil Co.	3.45
Dec.	14	Geo. A. Kennison	27.00

Dec.	14	P. H. Plaisted	$10.00
Dec.	14	Waterville & Fairfield R'y. & Light Co.	3.85
Dec.	14	W. S. Dunham	7.50
Dec.	14	G. S. Flood & Co.	44.97
Dec.	14	W. T. Reynolds	18.00
Dec.	14	S. A. & A. B. Green	13.50
Dec.	14	Walter Branch	6.75
Dec.	14	W. M. Ladd Publishing Co.	37.10
Dec.	14	Walworth Mfg. Co.	3.94
Dec.	14	Joseph L. Labranch	11.00
Dec.	14	Proctor & Bowie Co.	116.26
Dec.	14	W. B. Arnold & Co.	12.54
Dec.	14	W. W. Berry & Co.	6.95
Dec.	14	Moore & Meservey	17.43
Dec.	14	William R. Conard	60.62
Dec.	14	The Lumsden & Van Stone Co.	182.78
Dec.	14	Rensselaer Mfg. Co.	171.60
Dec.	14	The Portland Company	1,948.43
Dec.	14	Aberthaw Construction Co.	6.37
Dec.	14	National Meter Co.	43.20
Dec.	14	Proctor & Bowie Co.	39.15
Dec.	14	Frank J. Savage & Co.	31.30
Dec.	14	Ira A. Mitchell	15.25
Dec.	14	W. B. Arnold & Co.	223.46
Dec.	14	New England Tel. & Tel. Co.	41.89
Dec.	14	Scott B. Stewart	5.63
Dec.	14	J. O. Peck	4.00
Dec.	14	W. M. Ladd Pub. Co.	5.00
Dec.	15	A. S. Hall, Sup't.	183.50
Dec.	17	Warren Foundry & Machine Co.	2,537.29
Dec.	17	Wells Express	31.75
Dec.	17	Joseph L. Labranch	20.25
Dec.	19	G. L. Learned & Co.	43.94
Dec.	19	Messalonskee Electric Co.	104.86
Dec.	19	Messalonskee Electric Co.	1.32
Dec.	19	Geo. W. Reynolds & Son	31.10
Dec.	19	Maine Central R. R. Co.	17.33
Dec.	22	Loring N. Farnum	5,000.00
Dec.	22	Albert S. Hall	300.00
Dec.	23	The Lumsden & Van Stone Co.	847.02
Dec.	23	The Portland Company	19.50
Dec.	23	Wells Express	13.75
Dec.	23	Benj. E. Brann	46.00
Dec.	23	Walter M. Vose	45.50
Dec.	28	Hascall S. Hall, Cashier	1,187.50
Dec.	28	R. D. Wood & Co.	6,973.44
Dec.	29	W. B. Arnold & Co.	47.91
Dec.	29	New England Tel. & Tel. Co.	3.50
Dec.	31	A. S. Hall, Sup't	192.13
1905			
Jan.	5	William T. Barnes	193.00
Jan.	5	Maine Central R. R. Co.	14.44
Jan.	5	George F. Crosby	44.30
Jan.	7	F. S. Moseley & Co.	62.50
Jan.	10	George S. Hewins	7,510.30
Jan.	11	George S. Hewins	2,287.20

Jan.	12	A. S. Hall, Sup't	$14.51
Jan.	12	Standard Oil Co	3.30
Jan.	12	Mail Publishing Co	1.25
Jan.	12	Hollingsworth & Whitney Co	152.61
Jan.	12	Geo. A. Kennison	27.50
Jan.	12	G. S. Flood & Co	67.02
Jan.	12	H. T. Winters	5.34
Jan.	12	W. B. Arnold & Co	9.80
Jan.	12	Day & Smiley	23.12
Jan.	12	Joseph L. Labranch	8.85
Jan.	12	Mark T. Claflin	13.22
Jan.	12	Waterville & Fairfield R'y. & Light Co	2.95
Jan.	12	D. U. Clement	2.75
Jan.	12	G. L. Learned & Co	5.91
Jan.	12	Harry E. Green	15.00
Jan.	12	E. Buxton & Son Company	3.44
Jan.	12	J. J. Pray	50.70
Jan.	12	W. T. Reynolds	34.50
Jan.	12	G. Ferullo	884.17
Jan.	12	G. Ferullo	1,030.52
Jan.	14	J. H. Goddard	105.00
Jan.	16	A. S. Hall, Sup't	177.38
Jan.	20	W. B. Arnold & Co	382.87
Jan.	20	American Woolen Co	108.00
Jan.	20	Builders Supply Co	621.00
Jan.	20	F. W. Coombs	6.75
Jan.	20	Day & Smiley	34.87
Jan.	20	G. S. Flood & Co	422.45
Jan.	20	F. O. Hussey	3.80
Jan.	20	G. L. Learned & Co	98.57
Jan.	20	Hanson, Webber & Dunham	3.00
Jan.	20	Messalonskee Electric Co	.80
Jan.	20	Maine Central R. R. Co	80.37
Jan.	20	Proctor & Bowie Co	113.68
Jan.	20	W. T. Reynolds	1,698.33
Jan.	20	W. P. Stewart Co	1.00
Jan.	20	Warren Seaward	5.23
Jan.	20	Waterville Iron Works	146.86
Jan.	20	The E. Buxton & Son Co	88.00
Jan.	21	Horace Purinton Co	3,500.00
Jan.	30	F. S. Moseley & Co	62.50
Jan.	31	A. S. Hall, Sup't	185.80
Jan.	31	Hascall S. Hall, Cashier	2,375.00
Jan.	31	A. M. Drummond & Co	18.90
Jan.	31	Waterville Trust Co	125.00
Jan.	31	Harry E. Green	46.31
Jan.	31	Messalonskee Electric Co	3.01
Jan.	31	Horace Purinton Co	77.05
Jan.	31	Leonard Metcalf	1,033.50
Jan.	31	W. S. Bradley	16.20
Jan.	31	The Ludlow Valve Mfg. Co	80.00
Jan.	31	Proctor & Bowie Co	6.00
Jan.	31	J. A. Davison	10.45
Jan.	31	Day & Smiley	5.11
Jan.	31	New England Tel. & Tel. Co	13.70
Jan.	31	Wells Express	15.00
Jan.	31	Hollingsworth & Whitney Co	7.28

Jan.	31.	The Morss & Whyte Co.	$20.20
Jan.	31	Hanson, Webber & Dunham	12.65
Jan.	31	Horace Purinton Co.	55.50
Jan.	31	D. U. Clement	18.25
Feb.	2	William T. Barnes	259.80
Feb.	6	Geo. S. Hewins	200.00
Feb.	7	Geo. S. Hewins	500.00
Feb.	9	Geo. S. Hewins	2,337.15
Feb.	9	Geo. S. Hewins	5,389.70
Feb.	15	F. C. Thayer	34.00
Feb.	15	W. S. Wyman	34.00
Feb.	15	V. R. Connor	32.00
Feb.	15	S. A. Nye	26.00
Feb.	15	I. E. Getchell	8.00
Feb.	16	A. S. Hall, Sup't	54.64
Feb.	16	Tucker Printing Co.	13.50
Feb.	16	S. A. & A. B. Green	153.96
Feb.	16	Kennison & Newell	38.63
Feb.	16	D. F. Paige & Co.	22.00
Feb.	16	Edward C. Marcia	69.11
Feb.	16	Geo. A. Kennison	20.18
Feb.	16	W. B. Arnold & Co.	11.20
Feb.	16	V. R. Connor	3.50
Feb.	16	Joseph L. Labranch	3.85
Feb.	16	Summit Springs Water Co.	.86
Feb.	16	Waterville & Fairfield R'y. & Light Co.	4.65
Feb.	16	G. S. Flood & Co.	66.74
Feb.	16	A. S. Hall, Sup't	281.80
Feb.	16	Maine Central R. R. Co.	24.00
Feb.	17	Edson F. Hitchings	30.00
Feb.	17	Barber Asphalt Paving Co.	130.65
Feb.	18	W. B. Arnold & Co.	960.44
Feb.	18	W. S. Bradley	15.45
Feb.	18	Harold L. Bond Co.	.35
Feb.	18	Geo. H. Cates	34.83
Feb.	18	Day & Smiley	9.99
Feb.	18	Geo. S. Flood & Co.	685.82
Feb.	18	Ernest Gagnon	21.30
Feb.	18	The Ingersoll Sargeant Drill Co.	4.32
Feb.	18	G. L. Learned & Co.	34.34
Feb.	18	Andrew J. Morse & Son	8.50
Feb.	18	Ira A. Mitchell	11.00
Feb.	18	Robert Parks	28.30
Feb.	18	W. T. Reynolds	219.39
Feb.	18	Standard Oil Co.	7.88
Feb.	22	E. B. Drummond & Co.	72.72
Feb.	22	Harry E. Green	39.00
Feb.	22	Waterville Iron Works	572.19
Feb.	22	Messalonskee Electric Co.	171.04
Feb.	22	Day & Smiley	.94
Feb.	22	Horace Purinton Co.	19.48
Feb.	22	Standard Oil Co.	3.00
Feb.	22	Redington & Co.	1.75
Feb.	22	Hollingsworth & Whitney Co.	4.43
Feb.	22	Geo. S. Flood & Co.	4.00
Feb.	22	Vigue Harness & Carriage Co.	14.45
Feb.	22	The Lumsden & Van Stone Co.	878.88

Feb. 22	Ira A. Mitchell	$8.00
Feb. 22	Perrin, Seamans & Co	68.54
Feb. 22	G. L. Learned & Co	90.71
Feb. 22	W. B. Arnold & Co	113.60
Feb. 22	A. M. Drummond & Co	10.00
Feb. 27	Hascall S. Hall, Cashier	1,781.25
Feb. 27	Harvey D. Eaton	100.00
Feb. 28	A. S. Hall, Sup't	1.75
Feb. 28	Redington & Co	151.55
Feb. 28	William T. Barnes	188.62
Feb. 28	A. S. Hall, Sup't	268.37
Mar. 1	Maine Central R. R. Co	.26
Mar. 2	Geo. S. Hewins	400.00
Mar. 6	A. S. Hall, Sup't	14.43
Mar. 6	J. L. Labranch	12.15
Mar. 6	Mark T. Claflin	11.10
Mar. 6	Vacuum Oil Co	22.45
Mar. 6	Walworth Mfg. Co	10.30
Mar. 6	Edward C. Marcia	11.73
Mar. 6	Standard Oil Co	3.00
Mar. 6	Chadwick-Boston Lead Co	8.00
Mar. 6	Waterville & Fairfield R'y. & Light Co	2.65
Mar. 6	Geo. A. Kennison	20.35
Mar. 6	S. A. & A. B. Green	591.94
Mar. 6	Rensselaer Mfg. Co	10.35
Mar. 6	Nightingale & Childs Co	94.00
Mar. 6	The Portland Company	350.00
Mar. 6	New England Tel. & Tel. Co	34.07
Mar. 6	H. N. Beach	3.50
Mar. 6	A. M. & H. Redington	3.82
Mar. 6	G. L. Learned & Co	342.58
Mar. 6	Leonard Metcalf	1,094.54
Mar. 6	Ira E. Getchell	24.00
Mar. 6	The Wardwell-Emery Co	57.45
Mar. 6	Harry E. Green	9.37
Mar. 8	Geo. S. Hewins	400.00
Mar. 9	Geo. S. Hewins	2,915.00
Mar. 9	Geo. S. Hewins	5,554.95
Mar. 15	Hanson, Webber & Dunham	12.65
Mar. 15	Harry E. Green	6.00
Mar. 15	D. U. Clement	2.60
Mar. 15	W. B. Arnold & Co	176.15
Mar. 15	L. T. Boothby & Son Co	270.00
Mar. 15	Theodore E. Hardy	10.00
Mar. 15	The Barber Asphalt Paving Co	150.00
Mar. 15	The E. Buxton & Son Co	42.30
Mar. 15	Geo. S. Flood & Co	412.12
Mar. 15	E. B. Lord	1.25
Mar. 15	Andrew J. Morse & Son	13.72
Mar. 15	C. W. Mower	5.50
Mar. 15	Proctor & Bowie Co	7.15
Mar. 15	Waterville & Fairfield R'y. & Light Co	1.80
Mar. 15	Geo. H. Cates	36.21
Mar. 15	E. E. Wilson	1.50
Mar. 15	W. B. Arnold & Co	231.43
Mar. 15	A. S. Hall, Sup't	263.97
Mar. 16	Harvey D. Eaton	4,928.25

Mar. 16	George K. Boutelle	$1,500.00
Mar. 16	New England Tel. & Tel. Co.	47.50
Mar. 21	C. E. Roberts, Manager	84.00
Mar. 22	R. M. Small	2.50
Mar. 22	W. E. Pope	5.00
Mar. 22	Robert Parks	21.00
Mar. 22	Ernest Gagnon	21.00
Mar. 22	J. Butterfield	20.00
Mar. 22	W. S. Dunham	27.00
Mar. 27	John Ware	151.60
Mar. 27	A. M. & H. Redington	11.35
Mar. 27	Leonard Metcalf	757.19
Mar. 27	W. B. Arnold & Co.	9.57
Mar. 27	G. S. Flood & Co.	159.13
Mar. 27	Messalonskee Electric Co.	49.50
Mar. 30	W. T. Reynolds	564.54
Mar. 30	Hollingsworth & Whitney Co.	172.00
Mar. 31	Hascall S. Hall, Cashier	593.75
Mar. 31	Frederick C. Thayer	15.79
Mar. 31	Maine Central R. R. Co.	3.70
Mar. 31	A. S. Hall, Sup't	262.50
Mar. 31	Horace Purinton & Co.	3,400.00
Apr. 4	William T. Barnes	116.45
Apr. 5	Geo. S. Hewins	700.00
Apr. 8	Harry Branch	8.75
Apr. 8	New York Times	25.20
Apr. 8	A. S. Hall, Sup't	.18
Apr. 10	Geo. S. Hewins	3,603.30
Apr. 10	Geo. S. Hewins	3,803.45
Apr. 10	A. S. Hall, Sup't	13.78
Apr. 12	W. B. Arnold & Co.	41.19
Apr. 12	Waterville & Fairfield R'y. & Light Co.	2.65
Apr. 12	Mail Publishing Co.	2.50
Apr. 12	S. A. & A. B. Green	537.16
Apr. 12	Blaisdell Machine Co.	8.25
Apr. 12	W. W. Berry & Co.	3.00
Apr. 12	Redington & Co.	11.00
Apr. 12	A. P. Emery	32.10
Apr. 12	Geo. A. Kennison	20.13
Apr. 12	Messalonskee Electric Co.	16.58
Apr. 12	C. E. Tupper & Co.	15.00
Apr. 12	Standard Oil Co.	5.50
Apr. 12	Geo. S. Flood & Co.	419.05
Apr. 12	Joseph L. Labranch	23.30
Apr. 12	New England Tel. & Tel. Co.	22.92
Apr. 12	G. W. Fitzgerald	.90
Apr. 12	G. L. Learned & Co.	29.14
Apr. 12	W. S. Bradley	18.70
Apr. 12	The E. Buxton & Son Co.	7.50
Apr. 12	H. & L. Chase	6.50
Apr. 12	W. T. Reynolds	55.30
Apr. 12	Warren Seaward	3.07
Apr. 12	Fred F. Whitney	1.50
Apr. 12	Barber Asphalt Paving Co.	152.00
Apr. 14	William B. Dana Co.	33.00
Apr. 14	B. P. Wells	10.50
Apr. 14	Wadsworth, Howland & Co.	6.46

Apr.	14.	Morss & Whyte Co	$7.30
Apr.	14	Lewiston Bleachery & Dye Works	20.43
Apr.	14	The Pelton Water Wheel Co	50.00
Apr.	15	Maine Central Railroad Co	4.18
Apr.	15	A. S. Hall, Sup't	259.58
Apr.	26	Wiscasset, Waterville & Farmington R. R. Co	25.00
Apr.	29	Harvey D. Eaton	43.56
Apr.	19	Harvey D. Eaton	8.96
Apr.	30	Balance, Cash on hand	25,954.32
		Total, April 30, 1905	$889,562.00

Cash Statement

May 1, 1905—April 30, 1906

RECEIPTS

1905			
May	1	Balance from previous Statement	$25,954.32
May	9	Lee, Higginson & Co	816,091.11
May	12	Aroostook Construction Co	747.50
May	13	Geo. S. Hewins	1,100.00
May	13	Geo. S. Hewins	18.00
May	20	Geo. S. Hewins	3.00
June	1	Collections	6,166.14
June	3	Lee, Higginson & Co	9,821.13
June	3	Standard Oil Co	26.70
July	1	Lee, Higginson & Co	24,623.33
July	1	Geo. S. Hewins	418.26
July	7	Collections	2,479.84
July	18	American Woolen Co	95.48
July	31	Collections	3,421.94
Aug.	3	Lee, Higginson & Co	24,701.10
Aug.	22	Somerset Railway	330.75
Sep.	5	Lee, Higginson & Co	9,908.64
Sep.	5	Collections	6,730.28
Sep.	18	Joe King	16.62
Sep.	20	W. A. R. Boothby, State Agent	74.00
Oct.	7	Lee, Higginson & Co	19,883.39
Oct.	7	Collections	2,019.09
Oct.	26	Newport Water Co	4.00
Oct.	31	Collections	1,782.55
Nov.	3	Lee, Higginson & Co	9,791.97
Nov.	3	A. S. Hall, Sup't	4.00
Nov.	11	J. L. Parkin & Son	64.21
Nov.	13	State Dep't., Inland F. & G	12.92
Nov.	18	Wells Express	1.00
Dec.	5	Collections	7,341.99
Dec.	9	W. A. R. Boothby, State Agent	15.15

1906			
Jan.	3	W. B. Arnold & Co	
Jan.	3	Waterville Iron Works	$3.00
Jan.	3	American Woolen Co	412.39
Jan.	5	Collections	51.14
Jan.	10	A. S. Hall, Sup't	3,182.37
Jan.	12	Rensselaer Mfg. Co	75.00
Jan.	12	E. Buxton & Son Co	14.20
Jan.	17	Augusta Water District	7.08
Jan.	19	W. A. R. Boothby, State Agent	21.62
Jan.	20	Waterville Iron Works	50.00
Jan.	31	Collections	187.12
Feb.	12	E. Buxton & Son Co	3,612.41
Feb.	12	Eastern Expanded Metal Co	3.00
Feb.	25	Boothby & Bartlett, Agents	12.00
Mar.	7	Collections	3.15
Mar.	7	A. S. Hall, Sup't	6,252.62
Mar.	21	A. S. Hall, Sup't	20.00
Apr.	4	Collections	78.72
Apr.	4	A. S. Hall, Sup't	3,192.98
Apr.	7	R. M. Small	29.02
Apr.	30	Collections	100.00
			1,045.60
		Total, April 30, 1906	$992,001.83

Cash Statement

May 1, 1905—April 30, 1906

DISBURSEMENTS

1905			
May	1	A. S. Hall, Sup't	$261.00
May	3	Sumner Rowe	43.45
May	3	Gedeon Picher	9.71
May	3	National Meter Co	12.40
May	3	Hanson, Webber & Dunham	27.85
May	3	Engineering Record	22.40
May	3	Engineering News	20.40
May	3	New England Tel. & Tel. Co	9.03
May	3	Leonard Metcalf	859.07
May	3	F. C. Thayer	26.00
May	3	W. S. Wyman	20.00
May	3	V. R. Connor	22.00
May	3	S. A. Nye	26.00
May	3	I. E. Getchell	14.00
May	4	A. S. Hall, Sup't	26.80
May	5	Geo. S. Hewins	700.00
May	5	William T. Barnes	88.15
May	6	Belfast Savings Bank	5,020.84
May	9	National Shawmut Bank	100,000.00
May	10	National Shawmut Bank	14,567.25
May	10	National Shawmut Bank	717.19

			$2,714.25
May	13	Geo. S. Hewins	1,781.20
May	13	Geo. S. Hewins	59.00
May	13	F. C. Thayer	410.00
May	15	The New York Bank Note Co.	281.70
May	15	A. S. Hall, Sup't	12.93
May	16	A. S. Hall, Sup't	183.02
May	16	W. B. Arnold & Co.	7.00
May	16	B. P. Wells	82.51
May	16	W. N. Hughes	39.40
May	16	W. T. Reynolds	19.80
May	16	George A. Kennison	2.65
May	16	Waterville & Fairfield Railway & Light Co.	10.00
May	16	Tucker Printing Co.	15.61
May	16	Sumner & Goodwin Co.	8.40
May	16	J. L. Labranch	36.00
May	16	W. S. Dunham	4.12
May	16	E. C. Marcia	31.38
May	16	New England Tel. & Tel. Co.	5.75
May	16	Mail Publishing Co.	6.40
May	16	R. W. Alley	9.00
May	16	American Woolen Co.	153.15
May	16	George H. Cates	14.61
May	16	Day & Smiley	.60
May	16	Messalonskee Electric Co.	8.50
May	16	Andrew J. Morse & Son	53.50
May	16	Proctor & Bowie Co.	1.94
May	16	George S. Flood & Co.	13.00
May	16	Standard Oil Co.	6.25
May	16	George W. Taylor	2.50
May	16	Waterville Granite Co.	34.26
May	16	Hanson, Webber & Dunham	26.50
May	16	Ira A. Mitchell	1,790.85
May	16	Rensselaer Mfg. Co.	10.04
May	16	Shultz Belting Co.	40.14
May	16	G. L. Learned & Co.	31.50
May	20	George R. Cook	1.75
May	29	A. S. Hall, Sup't	3.75
May	29	Waterville Sentinel Publishing Co.	9.15
May	29	J. A. Davison	8.59
May	29	Day & Smiley	45.00
May	29	A. M. Drummond & Co.	670.21
May	29	Leonard Metcalf	6.84
May	31	Maine Central Railroad Co.	269.99
June	1	A. S. Hall, Sup't	2,591.50
June	2	Geo. S. Hewins	756.10
June	2	Geo. S. Hewins	9.39
June	2	A. S. Hall, Sup't	2.65
June	2	Waterville & Fairfield R'y. & Light Co.	6.00
June	2	George E. Gilchrist Co.	5.50
June	2	Chadwick Boston Lead Co.	.80
June	2	George S. Ricker & Co.	3.85
June	2	Messalonskee Electric Co.	13.46
June	2	George A. Kennison	1.00
June	2	Standard Oil Co.	110.62
June	2	S. A. & A. B. Green	76.26
June	2	Geo. L. Learned & Co.	17.55
June	2	Burt Mfg. Co.	

June	2	Joseph L. Labranch	$11.50
June	2	W. B. Arnold & Co	53.34
June	2	Clayton Air Compressor Works	94.00
June	2	Builders Iron Foundry	9.35
June	2	Warren Foundry & Machine Co	9,534.12
June	2	Edward L. Priest	10.00
June	2	Julian D. Taylor	71.50
June	3	William R. Conard	80.01
June	19	D. A. Hescock	30.00
June	30	Harvey D. Eaton, Atty	315.56
June	30	The Vigue Harness & Carriage Co	5.47
June	30	New England Tel. & Tel. Co	5.32
June	30	Burleigh & Flynt	5.00
June	30	H. T. Winters	6.00
June	30	W. B. Arnold & Co	69.14
June	30	Messalonskee Electric Co	25.00
June	30	W. S. Bradley	26.85
June	30	D. B. Cates	2.00
June	30	New England Tel. & Tel. Co	6.96
June	30	W. T. Reynolds	9.75
June	30	Warren Seaward	.50
June	30	Proctor & Bowie Co	24.47
June	30	William T. Barnes	84.37
June	30	Maine Central R. R. Co	39.86
June	30	A. S. Hall, Sup't	254.50
June	30	Geo. S. Hewins	403.10
June	30	Geo. S. Hewins	275.00
June	30	A. S. Hall, Sup't	264.18
June	30	Maine Central R. R. Co	14.77
July	6	Maine Central R. R. Co	4.47
July	7	William T. Barnes	214.95
July	7	C. K. Mathews & Co	115.00
July	7	New England Tel. & Tel. Co	4.50
July	7	Fred Pooler	22.00
July	7	Davis & Farnum Mfg. Co	29.83
July	7	Ira A. Mitchell	45.50
July	7	D. U. Clement	10.50
July	7	William R. Conard	106.17
July	7	Boylston Construction Co	4,674.72
July	7	W. B. Arnold & Co	24.10
July	7	G. W. Fitzgerald	15.73
July	7	G. S. Flood & Co	1.94
July	7	Hallowell Granite Co	90.00
July	7	Theodore Randall	4.50
July	7	S. A. & A. B. Green	302.50
July	7	Mail Publishing Co	2.75
July	7	H. M. Flood	7.50
July	7	Merrill, Runnels & Mayo Co	2.50
July	7	Waterville & Fairfield R'y. & Light Co	2.65
July	7	National Meter Co	40.00
July	7	George A. Kennison	14.76
July	7	Messalonskee Electric Co	1.50
July	7	Frank Lenmen	4.00
July	7	M. Thurmel	2.65
July	7	George E. Gilchrist Co	246.48
July	7	Mathew E. Hodges	40.00
July	7	A. S. Hall, Sup't	5.48

July 7	Warren Foundry & Machine Co.	$20,415.06
July 11	Deane Steam Pump Co.	279.14
July 11	Ira E. Getchell	100.00
July 18	A. S. Hall, Sup't	259.87
July 20	New England Tel. & Tel. Co.	23.45
July 20	Messalonskee Electric Co.	8.29
July 20	Waterville Sentinel Publishing Co.	91.35
July 20	Mail Publishing Co.	60.00
July 20	W. P. Stewart Co.	2.00
July 20	W. B. Arnold & Co.	20.39
July 20	L. T. Boothby & Son Co.	536.22
July 20	Ira A. Mitchell	18.25
July 20	Lumsden & Van Stone Co.	20.00
July 31	Leonard Metcalf	1,591.90
July 31	B. P. Wells	6.00
July 31	W. T. Reynolds	16.50
July 31	Horace Purinton Co.	88.65
July 31	F. F. Whitney	14.81
July 31	Hanson, Webber & Dunham	32.60
July 31	Day & Smiley Co.	153.23
Aug. 1	A. S. Hall, Sup't	252.88
Aug. 2	William T. Barnes	235.92
Aug. 2	F. C. Thayer	28.00
Aug. 2	W. S. Wyman	32.00
Aug. 2	V. R. Connor	30.00
Aug. 2	S. A. Nye	26.00
Aug. 2	I. E. Getchell	14.00
Aug. 3	Maine Central R. R. Co.	44.17
Aug. 4	A. S. Hall, Sup't	21.28
Aug. 4	D. B. Cragin	74.00
Aug. 4	Wells Express Co.	4.00
Aug. 4	Chadwick Boston Lead Co.	25.55
Aug. 4	Chapman Valve Mfg. Co.	64.87
Aug. 4	A. H. Totman	2.25
Aug. 4	National Meter Co.	51.60
Aug. 4	Waterville & Fairfield R'y. & Light Co.	3.65
Aug. 4	W. B. Arnold & Co.	6.48
Aug. 4	Messalonskee Electric Co.	2.55
Aug. 4	Standard Oil Co.	5.00
Aug. 4	George A. Kennison	7.50
Aug. 4	Mail Publishing Co.	7.50
Aug. 4	Ed. Crager	30.85
Aug. 4	William R. Conard	75.60
Aug. 4	Peter Barclay & Co.	10.00
Aug. 4	Flood & Barrett	11.59
Aug. 4	E. C. Wilson	9.38
Aug. 24	Boylston Construction Co.	6,932.49
Aug. 24	William T. Barnes	103.39
Aug. 24	A. S. Hall, Sup't	288.75
Aug. 24	William T. Barnes	74.59
Aug. 25	G. L. Learned & Co.	5.29
Aug. 25	Ira A. Mitchell	25.00
Aug. 25	J. L. Labranch	8.28
Aug. 25	The Portland Co.	30.87
Aug. 25	New England Tel. & Tel. Co.	3.20
Aug. 25	W. B. Arnold & Co.	7.75
Aug. 25	L. T. Boothby & Son Co.	75.00

Aug.	25	Niles & Niles	$10.00
Aug.	25	Leonard Metcalf	849.29
Aug.	25	Warren Foundry & Machine Co.	19,399.72
Aug.	25	Dean & Main	20.00
Aug.	25	M. J. Heminger	18.84
Aug.	25	William T. Barnes	98.52
Aug.	31	Maine Central R. R. Co.	22.65
Sep.	1	A. S. Hall, Sup't	267.12
Sep.	1	William T. Barnes	235.50
Sep.	1	Atherton Furniture Co.	54.35
Sep.	1	Rensselaer Mfg. Co.	423.25
Sep.	1	The Lumsden & Van Stone Co.	1,000.00
Sep.	6	William T. Barnes	90.31
Sep.	16	William T. Barnes	34.82
Sep.	16	William T. Barnes	92.71
Sep.	16	Maine Central R. R. Co.	2.11
Sep.	18	A. S. Hall, Sup't	287.25
Sep.	18	A. S. Hall, Sup't	40.63
Sep.	18	George A. Kennison	14.13
Sep.	18	S. A. & A. B. Green	117.45
Sep.	18	National Meter Co.	43.20
Sep.	18	Chadwick Boston Lead Co.	6.50
Sep.	18	Mail Publishing Co.	1.00
Sep.	18	Waterville & Fairfield R'y. & Light Co.	3.67
Sep.	18	W. B. Arnold & Co.	50.17
Sep.	18	Day & Smiley Co.	10.55
Sep.	18	J. L. Labranch	23.15
Sep.	18	Messalonskee Electric Co.	4.00
Sep.	18	George E. Gilchrist Co.	696.05
Sep.	18	M. T. Claflin	24.23
Sep.	18	Boylston Construction Co.	8,150.70
Sep.	18	Wells Express Co.	7.50
Sep.	18	W. S. Dunham	9.00
Sep.	18	Ira A. Mitchell	31.00
Sep.	18	A. H. Smart	12.00
Sep.	18	D. U. Clement	5.25
Sep.	18	Gedeon Picher	2.95
Sep.	18	W. T. Reynolds	73.00
Sep.	18	New England Structural Co.	650.00
Sep.	18	The Oakland Mfg. Co.	91.20
Sep.	18	William R. Conard	3.24
Sep.	18	J. A. Davison	16.55
Sep.	18	A. S. Hall, Sup't	1.75
Sep.	22	J. L. Parkin & Son	1,000.00
Oct.	2	Maine Central R. R. Co.	11.28
Oct.	2	Mary M. Jackson	20.00
Oct.	2	Mrs. V. C. Lord	85.00
Oct.	2	James Parent	20.00
Oct.	2	A. S. Hall, Sup't	281.25
Oct.	3	William T. Barnes	183.50
Oct.	3	William T. Barnes	151.21
Oct.	4	Leonard Metcalf	567.65
Oct.	4	Thomas Groom & Co.	3.25
Oct.	4	New England Tel. & Tel. Co.	2.96
Oct.	4	Rensselaer Mfg. Co.	33.00
Oct.	4	Day & Smiley Co.	43.23
Oct.	4	Lumsden & Van Stone Co.	18.83

Oct.	4	Oakland Mfg. Co	$44.18
Oct.	4	A. S. Hall, Sup't	34.43
Oct.	4	Town of Vassalboro	115.00
Oct.	5	J. L. Parkin & Son	1,284.50
Oct.	6	George A. Kennison	7.16
Oct.	6	S. A. & A. B. Green	5.00
Oct.	6	W. B. Arnold & Co	12.87
Oct.	6	Mark T. Claflin	12.80
Oct.	6	Standard Oil Co	5.25
Oct.	6	Walworth Mfg. Co	23.12
Oct.	6	Waterville & Fairfield R'y. & Light Co	3.67
Oct.	6	Boylston Construction Co	7,463.89
Oct.	6	Ira A. Mitchell	43.78
Oct.	6	Virgil R. Connor	43.99
Oct.	6	William R. Conard	7.06
Oct.	6	L. T. Boothby & Son Co	52.50
Oct.	6	A. S. Hall, Sup't	5.93
Oct.	7	Augustus Carey	15.00
Oct.	7	George H. Bussell	25.00
Oct.	16	A. S. Hall, Sup't	371.63
Oct.	19	William T. Barnes	200.00
Oct.	19	William T. Barnes	100.00
Oct.	20	G. S. Flood & Co	311.32
Oct.	20	Messalonskee Electric Co	2.65
Oct.	20	Union Water Meter Co	20.80
Oct.	20	George E. Gilchrist Co	1.75
Oct.	20	J. L. Labranch	28.30
Oct.	20	Wadsworth, Howland & Co	10.00
Oct.	20	Wells Express Co	8.00
Oct.	20	Aberthaw Construction Co	11.55
Oct.	20	Rensselaer Mfg. Co	130.50
Oct.	20	W. B. Arnold & Co	62.02
Oct.	20	Lumsden & Van Stone Co	49.37
Oct.	21	Leonard Metcalf	582.76
Oct.	21	American Woolen Co	50.00
Oct.	27	J. L. Parkin & Son	865.22
Oct.	27	W. S. Wyman	32.50
Oct.	27	F. C. Drummond	25.00
Oct.	31	Hascall S. Hall, Cashier	16,450.00
Oct.	31	Maine Central R. R. Co	54.22
Nov.	1	A. S. Hall, Sup't	416.62
Nov.	1	Helen Files	20.00
Nov.	2	Daniel A. Tower	25.00
Nov.	3	William T. Barnes	2.45
Nov.	3	William T. Barnes	164.89
Nov.	4	F. C. Thayer	22.00
Nov.	4	W. S. Wyman	22.00
Nov.	4	V. R. Connor	26.00
Nov.	4	S. A. Nye	24.00
Nov.	4	I. E. Getchell	14.00
Nov.	7	William T. Barnes	128.50
Nov.	11	J. L. Parkin & Son	139.18
Nov.	11	William T. Barnes	70.87
Nov.	16	A. S. Hall, Sup't	388.76
Nov.	16	Andrew L. McFadden	2.00
Nov.	17	Walworth Mfg. Co	10.42
Nov.	17	W. T. Reynolds	96.00

Nov. 17	Vigue Harness Co.	$7.40
Nov. 17	Davis & Farnum Mfg. Co.	103.95
Nov. 17	New England Tel. & Tel. Co.	25.18
Nov. 17	J. L. Labranch	21.05
Nov. 17	Mark Gallert	8.00
Nov. 17	Messalonskee Electric Co.	1.32
Nov. 17	Mark T. Claflin	25.77
Nov. 17	Waterville & Fairfield R'y. & Light Co.	3.67
Nov. 17	Central Maine Publishing Co.	9.25
Nov. 17	George E. Gilchrist Co.	37.69
Nov. 17	George A. Kennison	11.63
Nov. 17	Sargent, Dennison Co.	157.94
Nov. 17	M. M. Branch	10.75
Nov. 17	W. B. Arnold & Co.	16.02
Nov. 21	Ira A. Mitchell	41.21
Nov. 17	G. S. Flood & Co.	3.25
Nov. 17	People's National Bank, Trustee	40.00
Nov. 17	Wells Express Co.	34.75
Nov. 17	Wells Express Co.	1.00
Nov. 17	Chapman Valve Mfg. Co.	116.76
Nov. 17	D. U. Clement	7.75
Nov. 17	G. L. Learned & Co.	31.06
Nov. 17	New England Water Works Ass'n.	15.00
Nov. 17	Leonard Metcalf	525.84
Nov. 17	George K. Boutelle	1,375.00
Nov. 17	Virgil R. Connor	1.50
Nov. 17	Boylston Construction Co.	6,943.67
Nov. 17	Harry L. Holmes	200.00
Nov. 17	A. S. Hall, Sup't	10.68
Nov. 18	William T. Barnes	82.84
Nov. 25	William T. Barnes	95.47
Nov. 28	Maine Central R. R. Co.	2.19
Dec. 1	A. S. Hall, Sup't	456.38
Dec. 5	William T. Barnes	57.75
Dec. 5	William T. Barnes	135.09
Dec. 9	William T. Barnes	75.25
Dec. 13	George A. Chamberlain	300.00
Dec. 13	Ellen D. Garland	127.97
Dec. 15	A. S. Hall, Sup't	287.82
Dec. 15	William T. Barnes	52.50
Dec. 19	Mrs. Z. A. Butterfield	15.15
Dec. 21	A. S. Hall, Sup't	18.78
Dec. 21	Rensselaer Mfg. Co.	27.55
Dec. 21	Aberthaw Construction Co.	28.05
Dec. 21	Chapman Valve Co.	791.61
Dec. 21	Day & Smiley Co.	14.43
Dec. 21	W. B. Arnold & Co.	12.90
Dec. 21	W. B. Arnold & Co.	3.00
Dec. 21	Waterville Iron Works	412.39
Dec. 21	Waterville Iron Works	137.13
Dec. 21	Messalonskee Electric Co.	19.80
Dec. 21	G. S. Flood & Co.	270.23
Dec. 21	George E. Gilchrist Co.	116.21
Dec. 21	Waterville & Fairfield R'y. & Light Co.	3.67
Dec. 21	A. H. Totman	2.65
Dec. 21	John Fardy	3.90
Dec. 21	Central Maine Publishing Co.	1.50

Dec.	21	J. L. Labranch	$10.85
Dec.	21	W. B. Arnold & Co	49.58
Dec.	21	George A. Kennison	12.94
Dec.	21	Nightingale & Childs Co	723.00
Dec.	21	Chadwick Boston Lead Co	6.06
Dec.	21	Scott Tibbetts	27.40
Dec.	21	Summit Springs Water Co	68.25
Dec.	21	Waterville Marble & Granite Co	15.58
Dec.	21	W. T. Reynolds	24.00
Dec.	21	W. S. Dunham	9.00
Dec.	21	Ira A. Mitchell	37.43
Dec.	21	Warren Foundry & Machine Co	51.92
Dec.	21	W. S. Bradley	11.63
Dec.	21	Horace Purinton Co	291.20
Dec.	21	Wells Express Co	2.50
Dec.	21	G. W. Fitzgerald	26.89
Dec.	21	Flood & Barrett	95.50
Dec.	21	Proctor & Bowie Co	132.80
Dec.	23	William T. Barnes	54.77
Dec.	23	William T. Barnes	128.10
Dec.	30	Maine Central R. R. Co	12.02
Dec.	30	A. S. Hall, Sup't	266.87
1906			
Jan.	5	J. L. Parkin & Son	186.52
Jan.	6	Warren Foundry & Machine Co	2,280.04
Jan.	8	Theodore E. Hardy	50.00
Jan.	12	New England Tel. & Tel. Co	8.18
Jan.	12	Merrill, Runnels & Mayo Co	.70
Jan.	12	Nightingale & Childs Co	225.66
Jan.	12	Rensselaer Mfg. Co	14.20
Jan.	12	Rensselaer Mfg. Co	7.25
Jan.	12	Eastern Expanded Metal Co	400.00
Jan.	12	Wells Express Co	8.75
Jan.	12	W. T. Reynolds	4.00
Jan.	12	The Portland Company	60.03
Jan.	12	Wardwell-Emery Co	4.61
Jan.	12	Messalonskee Electric Co	18.90
Jan.	12	G. S. Flood & Co	3.35
Jan.	12	Standard Oil Co	6.90
Jan.	12	Sumner Rowe	49.99
Jan.	12	George A. Kennison	19.97
Jan.	12	S. A. & A. B. Green	10.00
Jan.	12	Hanson, Webber & Dunham	4.05
Jan.	12	Central Maine Publishing Co	8.50
Jan.	12	Joseph L. Labranch	13.00
Jan.	12	S. A. Dickinson	3.00
Jan.	12	Waterville & Fairfield R'y. & Light Co	3.67
Jan.	12	Horace Purinton Co	18.52
Jan.	12	W. B. Arnold & Co	66.82
Jan.	12	The George F. Blake Mfg. Co	1,757.39
Jan.	12	Leonard Metcalf	941.50
Jan.	12	G. W. Fitzgerald	1.23
Jan.	12	J. A. Davison	8.75
Jan.	12	Proctor & Bowie Co	139.19
Jan.	12	Waterville Iron Works	14.00
Jan.	12	A. S. Hall, Sup't	5.80

Jan.	15	A S. Hall, Sup't	$268.62
Jan.	31	Maine Central R. R. Co	1.23
Jan.	31	A. S. Hall, Sup't	263.13
Feb.	6	F. C. Thayer	26.00
Feb.	6	W. S. Wyman	24.00
Feb.	6	V. R. Connor	26.00
Feb.	6	S. A. Nye	24.00
Feb.	6	Hattie Peck	25.00
Feb.	12	New England Water Works Assn	15.00
Feb.	12	H. M. Hutchinson	3.15
Feb.	12	John Ware	82.72
Feb.	12	Ira A. Mitchell	22.72
Feb.	12	Perry T. Simpson	2.80
Feb.	12	James T. Clarkin	350.56
Feb.	12	Waterville Iron Works	124.60
Feb.	12	Eastern Expanded Metal Co	54.30
Feb.	12	W. B. Arnold & Co	194.69
Feb.	12	G. L. Learned & Co	179.80
Feb.	12	George F. Davies	7.95
Feb.	12	Day & Smiley Co	6.75
Feb.	12	E. Buxton & Son Co	3.00
Feb.	12	George A. Kennison	16.96
Feb.	12	National Meter Co	9.39
Feb.	12	Chapman Valve Mfg. Co	13.98
Feb.	12	H. M. Flood	8.25
Feb.	12	G. L. Learned & Co	2.50
Feb.	12	Mark T. Claflin	27.96
Feb.	12	Ed. Crager	11.25
Feb.	12	A. M. Drummond & Co	45.00
Feb.	12	George K. Boutelle	300.00
Feb.	12	L. M. Ham & Co	24.00
Feb.	12	J. L. Labranch	6.00
Feb.	12	Waterville & Fairfield R'y. and Light Co	3.67
Feb.	21	Messalonskee Electric Co	2.30
Feb.	12	S. A. & A. B. Green	157.64
Feb.	12	E. C. Marcia	9.48
Feb.	12	Carrie Phillips	9.70
Feb.	12	Eastern Expanded Metal Co	54.00
Feb.	12	Eastern Expanded Metal Co	12.00
Feb.	12	A. S. Hall, Sup't	41.48
Feb.	15	A. S. Hall, Sup't	244.24
Mar.	1	A. S. Hall, Sup't	215.50
Mar.	1	Messalonskee Electric Co	125.00
Mar.	1	Maine Central Railroad Co	5.20
Mar.	7	Leonard Metcalf	779.01
Mar.	15	Messalonskee Electric Co	37.67
Mar.	15	A. S. Hall, Sup't	215.87
Mar.	22	W. W. Nye	5.00
Mar.	22	Edward C. Rice	1.00
Mar.	22	Lockwood Company	.90
Mar.	22	A. M. Drummond & Co	20.00
Mar.	22	George E. Gilchrist Co	83.04
Mar.	22	National Meter Co	.50
Mar.	22	Central Maine Publishing Co	7.50
Mar.	22	A. H. Totman	1.53
Mar.	22	George A. Kennison	12.18
Mar.	22	H. T. Winters	3.68

Mar. 22	American Woolen Co	$11.03
Mar. 22	New England Tel. & Tel. Co	2.08
Mar. 22	W. & F. Railway & Light Co	6.67
Mar. 22	C. F. Lowe	3.40
Mar. 22	Joseph L. Labranch	6.75
Mar. 22	W. B. Arnold & Co	21.61
Mar. 22	A. S. Hall, Sup't	8.80
Mar. 31	A. S. Hall, Sup't	234.10
Mar. 31	Maine Central R. R. Co	13.69
Apr. 7	A. S. Hall, Sup't	9.70
Apr. 11	Messalonskee Electric Co	130.48
Apr. 16	A. S. Hall, Sup't	222.75
Apr. 16	Waterville Trust Co	300.00
Apr. 16	A. Joly	17.50
Apr. 16	George E. Gilchrist Co	166.21
Apr. 16	Davis & Farnum Mfg. Co	6.34
Apr. 16	James Clarkin	52.99
Apr. 16	Nightingale & Childs Co	63.28
Apr. 16	Crosby Steam Gage & Valve Co	9.50
Apr. 16	Storey, Thorndike, Palmer & Thayer	50.00
Apr. 16	W. B. Arnold & Co	11.15
Apr. 16	W. & F. Railway and Light Co	3.67
Apr. 16	George A. Kennison	15.11
Apr. 16	G. W. Fitzgerald	1.00
Apr. 16	Central Maine Publishing Co	5.50
Apr. 16	George E. Gilchrist Co	120.50
Apr. 16	Chadwick Boston Lead Co	6.50
Apr. 16	W. S. Wyman	14.00
Apr. 16	Thomas Groom & Co	69.00
Apr. 16	A. S. Hall, Sup't	11.72
Apr. 30	A. S. Hall, Sup't	255.20
Apr. 30	Balance, Cash on Hand	13,480.06
	Total, April 30, 1906	$992,001.83

Earnings & Expenses

May 10th, 1904—April 30th, 1905

Gross Earnings,		
Water Rates	$43,797.54	
Deduct Abatements	702.16	$43,095.38
Operating Expense,		
Schedule F		8,801.15
Net Earnings		$34,294.23
Sundry Earnings		513.70
Total Income		$34,807.93
Deductions,		
Interest on Notes	$32,851.21	
Brokerage on Notes	2,000.00	34,851.21
Net Income,—Deficit		$43.28

Earnings & Expenses

May 1st, 1905—April 30th, 1906

Gross Earnings,		
Water Rates	$46,237.35	
Deduct Abatements	586.51	$45,650.84
Operating Expense,		
Schedule G		12,878.89
Net Earnings		$32,771.95
Sundry Income		15.00
Total Income		$32,786.95
Deductions,		
Interest on Bonds	$31,594.33	
Interest on Notes	5.55	
Interest on Account	469.20	32,069.08
Net Income		$717.87

Schedule A

SHOWING NOTES PAYABLE OUTSTANDING APRIL 30th, 1904

Swan & Barrett,		
July 23rd, 1903, 1 year at 4%	$2,500.00	
Waterville Savings Bank,		
Nov. 5th, 1903, 6 months at 5%	2,000.00	
Belfast Savings Bank,		
Dec. 1st, 1903, 6 months at 5%	100,000.00	
Waterville Savings Bank,		
Jan'y 23rd, 1904, 6 months at 5%	10,000.00	
Belfast Savings Bank,		
Feb'y 1st, 1904, 6 months at 5%	100,000.00	
Androscoggin County Savings Bank,		
Feb'y 3rd, 1904, 6 months at 5%	10,000.00	
Waterville Savings Bank,		
Feb'y 13th, 1904, 6 months at 5%	10,000.00	
Fairfield Savings Bank,		
March 18th, 1904, 6 months at 5%	10,000.00	
Portland Savings Bank,		
March 19th, 1904, 6 months at 5%	25,000.00	
Gardiner Savings Institution,		
April 7th, 1904, 6 months at 5%	10,000.00	
Ticonic National Bank,		
April 28th, 1904, 6 months at 5%	10,000.00	$289,500.00

Schedule B

SHOWING NOTES PAYABLE OUTSTANDING APRIL 30th, 1905

Sold to F. S. Moseley & Company, Boston. Due May 1st, 1905

May 2nd, 1904,	Nos. 1—28	$300,000.00	
June 1st, 1904,	Nos. 29—40	100,000.00	
July 1st, 1904,	Nos. 41—45	50,000.00	
Aug. 1st, 1904,	Nos. 46—58	100,000.00	
Sept. 1st, 1904,	Nos. 59—66	75,000.00	
Oct. 1st, 1904,	Nos 67	25,000.00	
Nov. 1st, 1904,	Nos. 68	50,000.00	
Nov. 23rd, 1904	Nos. 69—70	25,000.00	
Dec. 15th, 1904,	Nos. 71—72	25,000.00	
Jan. 10th, 1905,	Nos. 73	25,000.00	
Feb. 1st, 1905.	Nos. 74—75	25,000.00	$800,000.00

Sold to Belfast Savings Bank, Belfast. Due May 8th, 1905

April 8th, 1905	$5,000.00	$5,000.00
		$805,000.00

Schedule C

SHOWING BONDS OUTSTANDING APRIL 30th, 1906

Due May 1st, 1910

Nos. 1—50, issued May 9th, 1905		$50,000.00

Due May 1st, 1915

Nos. 51—150, issued May 9th, 1905		100,000.00

Due May 1st, 1920

Nos. 151—300, issued May 9th, 1905		150,000.00

Due May 1st, 1925

Nos. 301—850, issued May 9th, 1905	$550,000.00	
Nos. 851—860, issued June 2nd, 1905	10,000.00	
Nos. 861—885, issued July 1st, 1905	25,000.00	
Nos. 886—910, issued Aug. 3rd, 1905	25,000.00	
Nos. 911—920, issued Sept. 2nd, 1905	10,000.00	
Nos. 921—940, issued Oct. 6th, 1905	20,000.00	
Nos. 941—950, issued Nov. 2nd, 1905	10,000.00	650,000.00
		$950,000.00

Schedule D

NET COST OF ACQUISITION APRIL 30th, 1905

Charges

EXPENSES,			
August 3rd, 1899—April 30th, 1905,			
Legal Expense		$39,566.73	
Engineering Expense		1,272.28	
Bacteriological Expense		3,354.65	
Sundry Expense		2,161.93	
Expense		729.16	$47,084.75
AWARD OF APPRAISERS,			
November 2nd, 1903			503,475.37
INTEREST ON AWARD,			
November 1st, 1903—May 9th, 1904			15,859.47
MESNE CHARGES,			
Maine Water Company Account,			
Nov. 1st, 1903—May 9th, 1904,			
Construction		$1,358.04	
Stock of Material		41.44	
Operating Expense,			
General	$2,959.05		
Special, Pumping	3,179.50		
Special, Maine Water Co.	988.47	7,127.02	
Hydrant Rental Account		1,282.30	9,808.80
INTEREST CHARGES,			
Accrued to May 99th, 1904,			
On Notes of First Series		4,947.65	
On portion of Notes of Second Series		254.07	5,201.72
SUNDRY CHARGES,			
Operating Account May 1st—9th, 1904		101.30	
Abatements May 1st—9th, 1904		29.53	
Collections on Income Account—			
May 1st—9th, 1904		1,317.60	1,448.43
Total Charges			$582,878.54

Deductions

MESNE CREDITS,	
Maine Water Company Account,	
Collections Nov. 1st, 1903—May 9th, 1904	$23,080.13

INTEREST CREDITS,			
To May 9th, 1904,			
On Partial Payments		$2,108.04	
On New Supply Account		128.91	
On Special Deposit		453.64	2,690.59
SUNDRY CREDITS,			
Accounts Receivable May 1st, 1904			293.30
Total Deductions			$26,064.02
Total Charges			$582,878.54
Total Deductions			26,064.02
Net Cost of Acquisition			$556,814.52

Schedule E

SHOWING PLANT, PROPERTY & FRANCHISES APRIL 30th, 1906

COST OF ACQUISITION,			
From Maine Water Company,			
See Schedule D		$556,814.52	
BETTERMENTS,			
May 1st, 1904—April 30th, 1906,			
Buildings & Fixtures	$523.75		
Dams, Hydrants, &c	1,173.60		
Steam Plant	39.35		
Station Machinery, &c	2,092.03		
Street Mains	102,464.36		
City Hydrants	1,036.01		
Meters	163.13		
New Services	571.03		
New Supply	267,408.43	375,471.69	$932,286.21
DEDUCTIONS,			506.68
			$931,779.53

Schedule E (1)

SHOWING DETAILS OF COST OF STREET MAINS APRIL 30th, 1906

Administration		
Printing & Advertising	$138.06	
Insurance	75.00	
Sundries	87.95	$301.01

Engineering

Leonard Metcalf & Engineering Assistants		$6,697.39

Construction

Pipe & Fittings	$56,245.81	
Sundry Materials	314.47	
Pipe Laying Contract	33,904.57	
Sundry Labor	773.49	
Bridge Crossings	3,285.21	
Sundries	942.41	95,465.96
		$102,464.36

Schedule E (2)

SHOWING DETAILS OF COST OF NEW SUPPLY APRIL 30th, 1906

Administration

Legal Expense	$4,069.67	
Travelling Expense	593.57	
Printing & Advertising	136.80	
Sundries	1,232.25	
Interest	128.91	$6,161.20

Engineering

William R. Hill	$1,868.04	
Leonard Metcalf & Engineering Assistants	13,921.75	
Board & Carriage	399.10	
General Expense	1,683.46	17,872.35

Construction

Rights of Way		$962.97	
Pumping Station, &c.,			
Station & Bridge	$13,413.43		
Piping, Valves, &c	3,122.74		
Labor & Sundries	3,272.14		
Cement & Rock	559.48		
Freight & Trucking	287.11		
Fuel & Pumping	178.49	20,833.39	
Steam Plant, Machinery, &c.,			
Pumps, Boilers, &c	$5,154.14		
Belting	10.04		
Labor & Sundries	567.52		
Freight & Trucking	126.23		
Fuel & Sundries	417.66	6,275.59	

China Lake Pipe Line,

Pipe Bought	*$91,432.72*		
Freight, Unloading, &c	*12,550.80*		
Inspection	730.99		
Pipe Laying	100,698.40		
Valves & Boxes	2,562.50		
Meter & Tube	301.11		
Cement	912.00		
Air Tank	225.00		
Supply Team, &c	447.85		
Feed,, Care, &c	425.81		
Damages	452.97		
Sundries	4,562.78	215,302.93	243,374.88
			$267,408.43

Schedule F

SHOWING OPERATING EXPENSE MAY 10th, 1904—APRIL 30th, 1905

Pumping & Distribution

Station Wages	$1,232.25		
Fuel Used	911.47		
Station Expense & Misc. Supplies	303.80		
Distribution Labor & Expense	130.80		
Repairs, Station Machinery	96.90		
Repairs, Buildings & Fixtures	37.30		
Repairs, Meters & Hydrants	329.96		
Repairs, Street Mains	484.55		
Repairs, Dams	37.90		
Repairs, Services	375.24	$3,940.17	

General Expenses

Salaries	$1,991.37		
Office Expenses	605.29		
Legal Expenses	43.56		
Insurance	165.90		
Sundry Expense	2,054.86	4,860.98	$8,801.15

Schedule G

SHOWING OPERATING EXPENSE MAY 1st, 1905—APRIL 30th, 1906

Pumping & Distribution

Station Wages	$1,669.37		
Fuel Used	1,630.17		
Station Expense & Misc. Supplies	683.35		
Distribution Labor & Expense	9.00		
Repairs, Station Machinery	322.72		
Repairs, Buildings & Fixtures	67.36		
Repairs, Meters & Hydrants	663.61		
Repairs, Street Mains	822.44		
Repairs, Dams	17.65		
Repairs, Reservoirs	20.45		
Repairs, Services	711.50	$6,617.62	

General Expenses

Salaries	$1,980.00		
Office Expenses	634.72		
Legal Expenses	3.70		
Insurance	122.54		
Sundry Expense	3,520.31	6,261.27	$12,878.89

AUDITOR'S CERTIFICATE

Having examined the accounts of George K. Boutelle, Treasurer of the Kennebec Water District, from August 3rd, 1899 to April 30th, 1906 inclusive, I hereby certify that the same are properly kept and in perfect balance, that all moneys received by him are fully accounted for, that all payments made by him are supported by suitable vouchers and that the Balance Sheets of April 30th, 1904, 1905 and 1906, as stated in the foregoing report, correctly represent the financial condition of the District as shown by his books on those dates.

HARRY L. HOLMES,

Auditor.

Waterville, Maine, June 30th, 1906.

RULES AND REGULATIONS



The following regulations shall be considered a part of the contract with every person who takes the water, and every such person by taking the water shall be considered to express his assent to be bound thereby. Whenever any one of them is violated the water shall be cut off from the place of such violation, and shall not be let on again except by the order of the Trustees of the District, and on payment of two dollars; and in case of any such violation, any payment made for the water by the person committing such violation shall be forfeited.

1. Persons desiring to use water must make application in writing at the office of the District. If any addition to, or alteration of any service pipe or fixture is desired, permission for such addition or alteration must be obtained from the District.

Work done on any premises by any other than a plumber licensed by the District will not be recognized, and no water will be turned on or allowed to be used in such cases.

No person or persons shall, in any way, or from any source obtain or use any water which comes from any main, water-pipe or hydrant of the District, or which comes from any water-pipe attached thereto or connected therewith, or from any fixtures through which the water of said District comes, without the previous consent of the District, or its Superintendent appointed to grant such consent.

2. All persons taking the water shall keep the service pipes to the main in good repair, and protect from frost, at their own expense, and they will be held liable for all damage which may result from their failure to do so. They shall prevent the waste of water in any way; and it must not be kept running to prevent freezing, or kept running at any time longer than is necessary in the proper use of it. Water will not be supplied to premises where Hopper Closets are used, unless the same shall be fitted with a self-closing cock.

3. All fixtures, apparatus and locations supplied with water must be accessible and open to the inspection of the District, or its agents, at all times, and all pipes and fixtures shall be subject to their rejection, if in their opinion they are unsuitable for the purpose.

Any officer of the District shall have the power to decide what shall be considered a waste or improper use of water, and to restrict the use thereof when deemed necessary.

4. No water rate is binding for more than three months, unless by written contract, and no consumer shall supply water to any one not entitled to the use of the same, except by written permit from the District, nor shall they use thereof for any purpose other than those set forth in their application or for which permission is afterward obtained.

5. The District shall have power to ascertain by meters the quantity of water used in any case, and a meter shall be affixed wherever in its judgment it is deemed expedient. All meters, whether provided by the District or by a consumer, shall be subject to the District's inspection at all times. The District reserves the right to make any repairs or changes it deems necessary to any meter, at the expense of its owner.



6. All water rates shall be payable at the office of the District in advance, and if not paid within thirty days after the same are due, the water shall be shut off without further notice and not be let on

again except on payment of two dollars. No discount will be made for vacant premises, unless the water is shut off by the District.

7. Hand Hose or Lawn Sprinklers are to be used on the premises of the taker only, during the hours before 7 A. M. and after 5 P. M. Hose rates are made for the use of hose held in the hand. Hose left running will be charged as Lawn Sprinkler.

During the existence of fire, all use of Hose is strictly forbidden, except for protection against such fire.

8. In making repairs or extensions, or for other necessary purposes of the works, the District reserves the right to shut off the water at once, and keep it shut off as long as necessary, and no claim for damages will be allowed therefor.

9. The use of fire hydrants for any other purpose than specified in the municipal contract is expressly prohibited.

10. In no case will water be turned on for less than a single faucet rate.

Full rates will be charged for all fixtures supplied by waste water.

11. In all occupied premises all fixtures through which water may be drawn, whether used or not, shall be charged for, so long as such fixtures shall remain connected with the pipes. In all cases the owner of the premises will be charged with the rent.

SCHEDULE OF RATES

DWELLING HOUSES	Yearly Prices
Occupied by one family, for the first faucet	$7 00
For each additional faucet, to be used by the same family	3 00
For the first water-closet	5 00
For each additional water-closet	3 00
For the first bath-tub	5 00
For each additional bath-tub	3 00
For each set bowl	3 00
For set laundry tubs, not more than three in a set	5 00
For each steam heater	1 00

BOARDING HOUSES	
For the first faucet (number of boarders not over five)	$12 00
For each additional boarder, per year	4 00
For each additional faucet	4 00
For water-closet (not over five boarders)	10 00
For each additional boarder, per year	50
For bath-tub, (not over five boarders)	10 00
For each additional boarder, per year	50

PRIVATE STABLES	
For first horse	$5 00
For each additional horse	3 00
For each cow (season rate)	2 00
This rate includes hose for washing Carriages only.	
In case there is no stable faucet, and no hose used for carriage washing, water being carried to stable from kitchen or other faucet on premises,	3 00
For each horse so supplied	2 00
For each cow so supplied, per season	

FOR LIVERY, CLUB AND BOARDING STABLES

One cent per day per horse.

TRUCKMEN'S STABLES

For first horse $3 00
For each additional horse 2 00
This rate does not include hose.

HOSE

For sprinkling lawns, washing windows, and similar uses, to be used only on premises, not exceeding two hours per day for each season, ⅛-inch nozzle $5 00
Lawn sprinklers, two hours each day 10 00
For all lawns having over 2000 square feet on which hose is used, an extra charge of two cents per square yard over that amount will be made.
This rate to be in addition to the first faucet rate.
This does not include the washing of carriages.
Hose nozzles used as fountains must be paid for in addition.

BUILDING PURPOSES

For each cask of lime or cement used 05

Prices for all purposes not above enumerated will be furnished upon written aplication.

Meter Rates

FOR DOMESTIC USES

25 cents ..... per 100 cu. ft.

FOR MANUFACTORIES

1st 10,000 cu. ft. a month, ... 15c. per 100 cu. ft.
2d 10,000 cu. ft. a month ..... 13c. per 100 cu. ft.
3rd 10,000 cu. ft. a month, ... 11c. per 100 cu. ft.
All in excess ..... 8c. per 100 cu. ft.

FOR ALL OTHER USES

1st 1000 cu. ft. per month ..... 25c. per 100 cu. ft.
2d 1000 cu. ft. per month ..... 15c. per 100 cu. ft.
All in excess ..... 12c. per 100 cu. ft.

In case the consumption of water does not amount to $20.00 for one year, the consumer will be required to pay a minimum rate of $20.00 in advance. Any consumer has the option of purchasing a meter from the District and having the same affixed in accordance with the above rates.

The Rules and Regulations and the Schedule of Rates are the same as those of the Maine Water Company no changes having yet been made.

FIRE HYDRANTS

WATERVILLE

No. 1 Western Ave. near northeast corner Burleigh St.
2 Western Ave. near northwest corner Elm St.
3 Elm St. near southwest corner School St.
4 Elm St. near southwest corner Winter St.
5 Elm St. near southwest corner Park St.
6 College Ave. near southwest corner Getchell St.
7 College Ave. near J. D. Taylor's, south M. C. R. R. crossing.
8 College Ave. about 100' south Alden St.
9 College Ave. westerly side St. between Ash and Oak Sts.
10 College Ave. near southeast corner High St.
11 College Ave. westerly side about 130' north of Myrtle St.
12 College Ave. near northwest corner Walnut St.
13 Silver St. near northeast corner Grove St.
14 Silver St. westerly side near No. 174.
15 Silver St. westerly side near No. 159.
16 Silver St. westerly side near No. ———
17 Silver St. westerly side near frog pond.
18 Silver St. westerly side opposite northerly line Gold St.
19 Silver St. westerly side near westerly line Elm St.
20 Silver St. westerly side opposite southerly line Silver Place.
21 Silver St. near southwest corner Spring St.
22 Main St. near northeast corner Lockwood St.
23 Main St. easterly side opposite northerly line Silver St.
24 Main St. easterly side near Whitcomb & Cannon store.
25 Main St. near northeast corner Temple St.
26 Main St. near northeast corner Appleton St.
27 Main St. westerly side 100' north of College St.
28 Main St. near southwest corner of North St.
29 Main St. near northwest corner of Wentworth Ct.
30 Main St. easterly side opposite northerly side Boutelle Ave.
31 Main St. near northeast corner Kelsey St.
32 Main St. near southeast corner High St.
33 Water St. near northwest corner Grove St.
34 Water St. near southwest corner King St.
35 Water St. near southwest corner Gold St.
36 Water St. near southwest corner Sherwin St.
37 Water St. westerly side opposite Lockwood store house.
38 Water St. westerly side opposite Lockwood mill.
39 Summer St. near southwesterly corner Sherwin St.
40 Summer St. westerly side about 40' south of Gray St.
41 Lockwood St. near northwest corner Bridge St.
42 Front St. near southwest corner Peavy Ct.
43 Front St. near southeast corner Temple St.
44 Front St. near northwest corner Appleton St.
45 Front St. westerly side about 130' north of Union St.
46 Ticonic St. near northwest corner Chaplin St.
47 Ticonic St. easterly side opposite north line Brook St.
48 Pleasant St. near northeast corner Western Ave.
49 Pleasant St. near northeast corner School St.
50 Pleasant St. near northeast corner Park St.
51 Pleasant St. near southeast corner Center St.
52 Pleasant St. near southerly junction of Main St.

No. 53 Oak St. near southeast corner Ticonic St.
54 High St. near northeast corner May St.
55 Dalton St. near southeast corner Nudd St.
56 Winter St. near southeast corner Pleasant St.
57 North St. northerly side opposite west line of Middle St.
58 Morrill Ave. northerly side near No. 9.
59 Charles St. westerly side near Labranch's shop.
60 Burleigh St. near southwest corner Winter St.
61 Morrill Ave. near northeast corner Burleigh St.
62 College Ave. near southwest corner Harold St.
63 Toward St. near northwest corner Maple St.
64 Head of Falls opposite 6" line from Union St.
65 King St. westerly side about 60' south of Gold St.
66 Grove St. near southeast corner Pine St.
67 Boutelle Ave. southerly side opposite King St.
68 Lawrence St. northerly side opposite end Nash St.
69 College Ave. westerly side 70' south Reservoir St.
70 College Ave. westerly side north of Holland Brook.
71 Pearson Road near Chase mill.
72 Western Ave. 600' west of bridge.
73 Front St. near City Hall west side.
74 Leighton St. near northeast corner Hathaway & Co.
75 Union St. near southeast corner College Ave.
76 Charles St. near southwest corner Temple St.
77 Common St. near southwest corner of Park.
78 Pine St. near southeast corner of Halde St.
79 Gray St. near southwest corner of Water St.
80 Oakland St. northerly side nearly opposite Oakland St. Pl.

FAIRFIELD

No. 1 Main St. westerly side midway between Cottage and High Sts.
2 Main St. near southeast corner Mace Ct.
3 Main St. near northeast corner Burrill St.
4 Main St. easterly side opposite Whittemore Co.
5 Main St. easterly side near F. S. Woodman's.
6 Summit St. near northwest corner Main St.
7 Main St. near E. Kelley's store.
8 Main St. near southeast corner Bridge St.
9 Main St. easterly side opposite Elm St.
10 Main St. near southwest corner Western Ave.
11 Main St. westerly side opposite pulp mill.
12 Main St. westerly side near G. H. Fairfield.
13 High St. westerly side about 100' south Burrill St.
14 High St. westerly side near N. Totman house.
15 High St. westerly side opposite Lawrence Ave.
16 High St. westerly side opposite Gilbreth St.
17 Maple St. near northwest corner Silver St.
18 Newhall St. near northwest corner Lawrence Ave.
19 Newhall St. near northwest corner Elm St.
20 Pleasant St. near southwest corner Water St.
21 Water St. near Fairfield Furniture Co. (S. A. Nye.)
22 Water St. opposite private way to Bridge St.
23 Private way in rear Main St. stores.
24 Western Ave. southerly side opposite Osborn St.
25 Western Ave. near southeast corner West St.

No. 26 West St. westerly side opposite Elm St.
27 Main St. near corner Cottage St.
28 Island St. near pulp mill.
29 Summit St. near driveway to M. C. R. R. station.
30 Island St. 50' north of C. G. Totman's house.

WINSLOW

No. 1 Benton Ave. near southwesterly corner Taconnet St.
2 Benton Ave. near southwesterly corner Beacon St.
4 Benton Ave. near southeasterly corner Stobie St.
5 Benton Ave. near log pile opposite Stobie house.
6 Pine St. near southwest corner Kennebec river road.
7 Pine St. near northeasterly corner Maple St.
8 Pine St. near westerly line of Bert Delano house.
9 Kennebec river road westerly side front of house owned by F. Fortier.
10 Kennebec river road westerly side at bend in road near Reynold's house.
11 Kennebec river road northerly side near south end Sebasticook bridge.
12 Kennebec river road easterly side near north line Congregational church.
13 Fuller road nearly opposite end of Birch St.

BENTON

No. 1 Benton Ave. opposite end of Bridge St.

Beside the above public hydrants which are maintained for the city and towns where located there are two hydrants on the District's grounds at the pumping station, two on the grounds of the Terry Manufacturing Company in Waterville, one on the grounds of the Lombard Steam Log Hauler Company in Waterville, one on the grounds of the S. A. Nye Manufacturing Company in Fairfield and twenty on the grounds of the Hollingsworth and Whitney Company in Winslow.

Test of Deane Compound Duplex 14"&26"–16"×18" Pumping Engine at Waterville Maine, for Kennebec Water District.

May 12, 1905.– Taking Water from Messalonskee Stream.– 8 Hour Run–

Note :– Deane Jet Condenser; 8"×14"×12" and Duplex Feed Pump; 5½×3½×5, Furnished with steam from portable boiler. Main Engine only run by Station Boilers.

Leonard Metcalf
Supervising Engineer
14 Beacon St.
Boston, Mass.

Time	Reading of Counter	Average Revolutions per Minute	Stroke Length in Feet: Right Side	Left Side	Mean	Water Gage Reading in Pounds	Water in Wetwell Race below Water Gage in Feet.	Total Lift in Feet	Engine Room Gages: Steam	Vacuum	Feed Water: Weighed in	Deduct Separator Water	Net Feed Water including Jacket Water	Jacket Water	Boiler Observations: Steam Gages #1 Left	#2 Right	Coal used Pounds	Temperatures Fahr.: Outside Air	Engine Room Air	Feed Water	Condenser Water
8-45 AM	365,246		1.50	1.86	1.68	98	11.0	237.	112	26.0					115	110		61	78	60	88
10-	368,913	37.8	1.50	1.50	1.50	98	11.0	237	107	25.5	1338.9		1238.5	77.5	110	110	800	62	76	60	86
10-15	369,362	37.2	1.50	1.50	1.50	99	11.0	240	106	25.1	1119.	17.5	1100.5	59.0	111	110	800	63	77	59	86
10-30	369,786	36.7	1.48	1.48	1.48	98	10.8	237	107	26.0	782.		782.	59.0	110	108		64	77	60	83
10-45	370,425	36.3	1.50	1.50	1.50	100	10.8	242	107	26.0	1259.	16.5	1242.5	82.5	109	108		66	77	60	84
11-	370,979	36.2	1.49	1.48	1.48	100	10.8	242	108	26.0	1209.5	16.5	1193.	55.5	113	108		66	77	60	85
11-15	371,491	36.1	1.49	1.49	1.49	101	10.8	244	107	26.0	1141	15.5	1125.5	60.5	108	108		63	77	60	84
11-30	372,028	36.0	1.50	1.49	1.495	102	10.9	246	105	26.0	778.		778.	75.5	111	105		68	78	60	84
11-45	372,539	35.9	1.50	1.50	1.50	102	10.9	246	106	26.0	1557.5	16.5	1541	70.0	111	108		66	80	61	85
12-	373,051	35.9	1.49	1.48	1.49	100	10.9	242	106	26.1	1228.		1220.	58.5	108	108		66	80	61	86
12-15	373,615	35.8	1.49	1.49	1.49	102	10.9	246	106	26.0	1131	19.5	1111.5	68.5	109	108		67	80	61	84
12-30	374,188	35.8	1.50	1.50	1.50	102	10.9	246	108	26.1	1206	16.0	1190.	86.5	110	108		67	79	61	83
12-45	374,698	35.8	1.52	1.52	1.52	97	10.8	235	108	26.0	774		774	60.0	112	108	400	68	79	61	88
1-	375,233	35.7	1.52	1.51	1.515	99	10.9	238	106	26.1	1553	16.0	1537	77.0	110	108		68	78	61	84
1-15	375,765	35.7	1.54	1.52	1.53	96	10.9	232	107	26.1	1548		1548	87.5	110	108	400	68	78	61	84
1-30	376,289	35.6	1.55	1.53	1.54	98	10.8	237	105	26.1	1610	16.0	1594	77.5	110	108		68	78	61	83
1-45	376,827	35.8	1.52	1.51	1.515	101	10.8	244	108	26.0	781		781	44.0	110	100	200	69	79	61	84
2-	377,358	35.7	1.52	1.51	1.515	101	10.8	244	108	26.2	1131	15.0	1116.	82.0	113	101	200	70	79	61	85
2-15	377,875	35.7	1.51	1.51	1.505	97	10.7	238	106	26.1	1201.	16.0	1185.	64.5	108	101		71	80	61	83
2-30	378,405	35.6	1.50	1.49	1.495	99	10.7	238	106	26.1	1138	15.0	1122.5	67.5	106	101		71	81	61	83
2-45	378,927	35.6	1.52	1.48	1.49	100	10.7	242	104	26.3				68.0	108	101	400	71	81	60	89
3-	379,440	35.6	1.54	1.51	1.525	105	10.7	253	107	26.2	2788.5	15.0	2773.	71.5	109	101		71	82	60	86
3-15	379,976	35.6	1.53	1.51	1.52	100	10.7	242	103	26.1	790.	13.8	776.2	67.5	109	101		71	82	60	84
3-30	380,488	35.5	1.52	1.53	1.525	102	10.7	246	110	26.2	1567		1567.	47.0	111	101	600	71	82	60	83
3-45	380,987	35.4	1.52	1.53	1.525	102	10.7	246	110	26.2	783	15.0	768	43.0	113	101		70	81	60	83
4-	381,516	35.4	1.51	1.50	1.505	100	10.7	242	106	26.2	1134		1134.	78.5	110	102		70	81	60	82
4-15	382,045	35.3	1.50	1.49	1.495	100	10.7	242	107	26.3	1208	20.0	1188	60.5	107	102	200	70	81	60	83
4-30	382,576	35.4	1.50	1.51	1.505	101	10.7	244	105	26.2	1141	15.5	1125.5	63.5	110	103	200	69	82	60	84
4-45	383,106	35.4	1.51	1.50	1.505	102	10.7	246	106	26.0	1222		1222.	76.5	111	103		69	81	60	84
5-	383,631	35.4	1.48	1.50	1.49	100	10.7	242	108	26.1	1137	15.5	1121.5	37.5	109	103		69	81	59	82
5-15	384,160	35.4	1.52	1.54	1.53	99	10.7	238	101	26.4	1214	15.5	1198.5	62.0	112	103		69	80	60	84
5-30	384,680	35.3	1.48	1.53	1.40	103	10.7	249	106	26.3	1130	18.5	1114.5	61.5	109	103	200	67	79	60	81
5-45	385,192	35.3	1.53	1.53	1.54	105	10.7	253	109	26.3	1283.5		1283.5	78.0	110	100	200	64	79	60	82
Totals	16,936 Revs										38726.9	324.5	38402.	2068.			4680				
Averages		35.90	1.508	1.501	1.504	103.87	10.79	248.2	107.5	26.1					110.1	103.9		67.6	79.3	60.2	84.

Duty = $\frac{16936 \times 1.505 \times 4 \times 10.26 \times 8.340 \times 242.8}{\frac{38402}{1000}}$ = 55,130,000 foot pounds per 1000# steam.

If we assume 3% for slip and leakage··· Duty = 53,480,000 . . . 1000# .
If we assume 5% for slip and leakage··· Duty = 52,370,000 . . . 1000# .

Notes: Ashes weighed out 159 pounds, leaving net coal used 4521 pounds. No determinations of moisture etc. were made.
Temperature of water pumped not known by reason of break in mercury column of thermometer used; assumed 59.2°F, 6° lower than feed water. Wt. of gallon of water = 8.340#.
Amount of jacket water recorded is somewhat below actual facts on account of the vapor accompanying the discharge of the jacket traps.
Total steam evaporated per pound of coal from 60.2° Fahr = $\frac{13.80 \text{ lbs. deduct. sep. water}}{1.0000 \text{ sep. water}}$ = 13.80 lbs. Total steam evaporated per pound of coal from and at 212° Fahr. = $\frac{10.23 \text{ lbs.}}{10.20 \text{ deduct. sep. water}}$
Total steam evaporated per square foot of boiler heating surface = $\frac{38402}{26240}$ = 1.91# per hr. Percentage of steam in separator (not changed to pump) as .836%.
Percentage of total steam supplied to pump which was used in jackets = 5.37%. Percentage of total boiler evaporation which was used in jackets = 5.33%.
Coal burned per hour per square foot of grate area = $\frac{4680}{240 \times 21.54}$ = 10.1 lbs.

May 13, 1905.– Taking Water from Well fed from China Lake Pipe Line.– 3 Hour Run.

Time	Reading of Counter	Average Revolutions per Minute	Stroke Length in Feet: Right Side	Left Side	Mean	Water Gage Reading in Pounds	Water in Well below Water Gage in Feet.	Total Lift in Feet	Engine Room Gages: Steam (8.27 lbs.)	Vacuum	Feed Water: Weighed in	Deduct Separator Water	Net Feed Water including Jacket Water	Jacket Water	Boiler Observations: Steam Gages #1 Left	#2 Right	Coal used Pounds	Temperatures Fahr.: Outside Air	Engine Room Air	Feed Water	Condenser Water
8-30 AM	387,601		1.49	1.51	1.50	110	3.3	257.	109	25.7					112	100		46	59	58	84
8-45	388,239	36.5	1.56	1.43	1.505	107	3.2	250.	109	25.8	1148		1148	68.5	110	100	400	47	60	56	83
9-	388,778	35.8	1.49	1.50	1.495	106	3.2	248.	108	25.9	1215	14.5	1200.5	45.0	111	101		48	62	54	84
9-15	389,301	35.8	1.49	1.50	1.495	105	3.1	245	108	26.0	1917		1917.	38.5	110	102	400	48	62	53	84
9-30	389,841	35.8	1.49	1.52	1.50	106	3.2	248	103	26.0	1217	15.5	1201.5	39.0	105	101	200	48	62	55	92
9-45	390,378	35.8	1.53	1.51	1.52	107	3.3	250	108	26.0				60.5	111	101	200	45	62	52	83
10-	390,914	35.8	1.52	1.52	1.52	108	3.2	253	103	26.1	1930	19.5	1910.5	43.0	110	101		49	61	50	83
10-15	391,434	35.6	1.53	1.52	1.525	108	3.3	253	107	26.2	1554	14.5	1539.5	64.0	112	102	200	48	61	51	83
10-30	392,004	35.9	1.54	1.53	1.535	105	3.3	246	109	26.4	1204	14.5	1189.5	63.5	109	102	200	46	61	52	83
10-35	392,244	35.8	1.54	1.52	1.53	109	3.3	255	107	26.3	1132	14.5	1117.5	73.5	109	101		49	60	52	82
11-	393,080	35.9	1.54	1.53	1.535	109	3.3	255	107	26.3	1015	13.5	1001.5	66.0	110	101	200	51	59	52	83
11-15	393,639	36.0	1.54	1.53	1.535	104	3.3	245	103	26.3	1142	14.5	1127.5	70.0	105	102	200	52	60	52	82
11-30	394,193	36.0	1.52	1.50	1.51	103	3.3	235	110	26.3	1468	5.0	1460.	73.0	111	102	200	54	60	52	82
11-45															113	103					
Totals	14,593 Revs										14939	126.0	14813.	721.5			2200				
Averages		36.01	1.521	1.511	1.516	107.08	3.25	250.5	107.2	26.1					109.5	101.4		48.5	60.1	52.7	82.6

Duty = $\frac{0.492 \times 1.516 \times 4 \times 10.26 \times 8.344 \times 250.5}{\frac{14813}{1000}}$ = 56,990,000 foot pounds per 1000# steam.

If we assume 3% for slip and leakage ··· Duty = 55,280,000 . . . 1000# . } Note the short period of test.
If we assume 5% for slip and leakage ··· Duty = 54,140,000 . . . 1000# .

May 13, 1905.– Taking Water from China Lake Pipe Line under Pressure.– 5 Hour Run.

Time	Reading of Counter	Average Revolutions per Minute	Stroke Length in Feet: Right Side	Left Side	Mean	Water Gage Reading in Pounds	Suction Gage Pressure in Pounds above Water Gage	Total Lift in Feet	Engine Room Gages: Steam	Vacuum	Feed Water: Weighed in	Deduct Separator Water	Net Feed Water including Jacket Water	Jacket Water	Boiler Observations: Steam Gages #1 Left	#2 Right	Coal used Pounds	Temperatures Fahr.: Outside Air	Engine Room Air	Feed Water	Condenser Water
11-45 AM	554,139		1.51	1.52	1.515	107	23.0	199	108	26.3					115	103		53	68	52	85
12-	555,254	37.0	1.50	1.52	1.51	108	25	192	105	26.4	1210.	15.0	1195	71.5	113	102		55	64	52	76
12-15	555,845	36.8	1.48	1.50	1.49	106	26	195	102	26.6	1573		1573	89.5	106	103	400	54	64	52	75
12-30	556,401	36.9	1.54	1.53	1.535	104	25	192	110	26.6	792	15.0	777	47.0	112	103		55	63	53	76
12-45	556,964	37.1	1.55	1.54	1.545	106	26	190	110	26.5	1141		1141	70.0	113	103		56	63	53	76
1-	557,516	37.2	1.50	1.52	1.51	106	25	197	106	26.4		13.5	1127.5	93.0	110	104	400	53	63	53	76
1-15	558,061	37.0	1.54	1.51	1.525	106	27	192	93	26.7	1211	15.0	1196	47.5	105	103		52	64	53	75
1-30	558,609	36.9	1.55	1.54	1.545	99	25	171	104	26.4	1144.	14.5	1129.5	77.5	103	101		51	65	53	75
1-45	559,165	36.9	1.50	1.52	1.51	104	26	180	108	26.0	786.		786	46.5	112	100	200	51	60	53	76
2-	559,723	35.9	1.50	1.48	1.490	104	27	178	102	25.7	780	14.5	765.5	70.5	105	101	200	49	59	53	73
2-15	560,278	36.9	1.50	1.50	1.50	105	26	182	103	25.7	1199	14.5	1184.5	50.5	105	101		49	60	53	74
2-30	560,829	36.9	1.54	1.50	1.52	107	26	197	105	25.8	1140	15.0	1125	61.5	108	101	200	48	61	53	75
2-45	561,371	36.8	1.59	1.53	1.56	107	27	185	108	26.2	786		786	63.0	105	102		50	63	53	74
3-	561,904	36.8	1.53	1.53	1.53	100	28	166	105	26.4	1217	20.5	1196.5	63.5	110	102		51	65	53	74
3-15	562,450	36.7	1.54	1.53	1.535	105	26	192	104	26.8	787	20.0	767	70.0	105	103	200	51	65	53	74
3-30	562,995	36.7	1.55	1.55	1.55	109	26	192	104	26.8	797	15.0	782	51.5	105	102	200	50	65	53	73
3-45	563,523	36.6	1.53	1.51	1.52	107	26	197	106	26.5	1131		1131	57.0	110	101		50	65	53	73
4-	564,059	36.6	1.51	1.47	1.49	109	27	159	106	26.8	780	15.0	774	57.0	105	101	17	52	65	53	74
4-15	564,615	36.6	1.55	1.53	1.54	101	26	173	107	27.0	1560	14.0	1546	81.0	103	102		52	64	53	73
4-30	565,154	36.5	1.51	1.51	1.51	105	27	197	109	27.0	793	14.5	778.5	49.5	101	102		51	64	53	73
4-45	565,698	36.5	1.53	1.52	1.525	103	27	190	105	27.0	808	21.0	787.	107.0	103	102		49	64	53	73
Totals	10,996 Revs										19426.	237.0	19189.	1302.9			2017				
Averages		36.52	1.526	1.519	1.522	103.29	26.14	192.1	105.2	26.5					107.1	102.0		51.4	63.4	52.8	75.

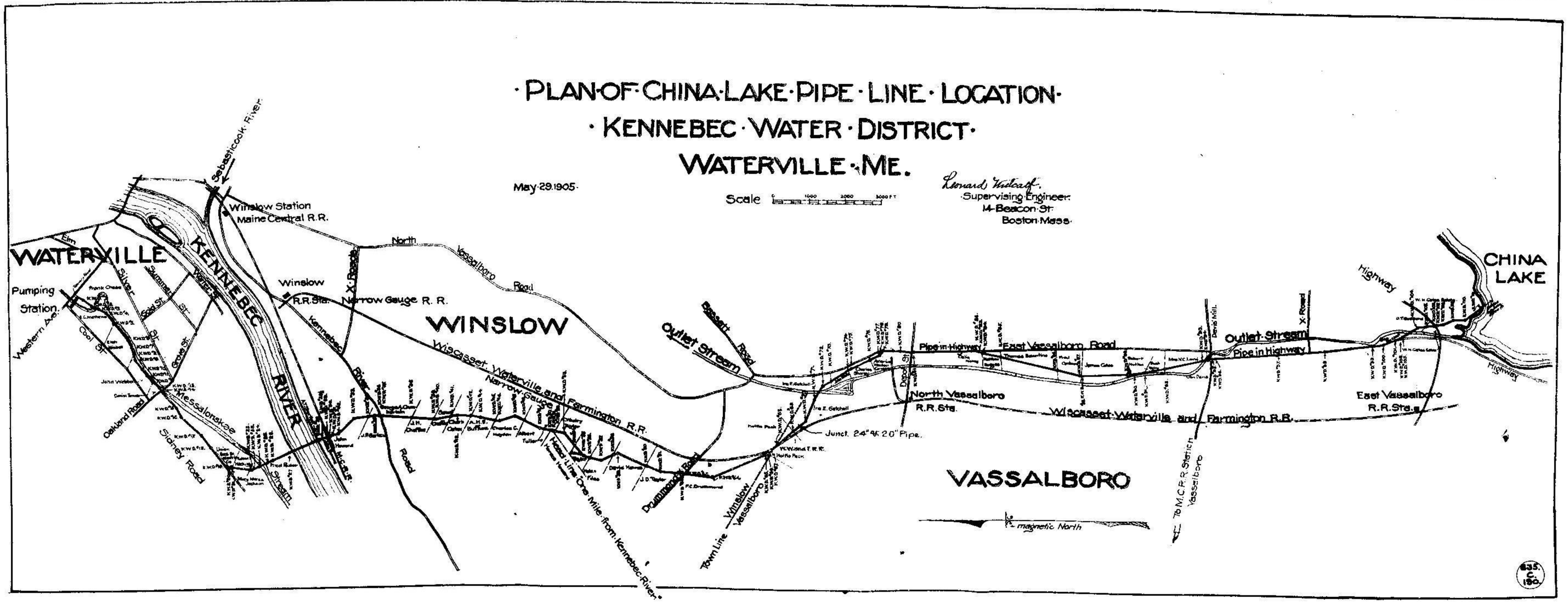
Duty = $\frac{10996 \times 1.522 \times 4 \times 10.26 \times 8.344 \times 192.1}{\frac{19189}{1000}}$ = 54,360,000 foot pounds per 1000# steam.

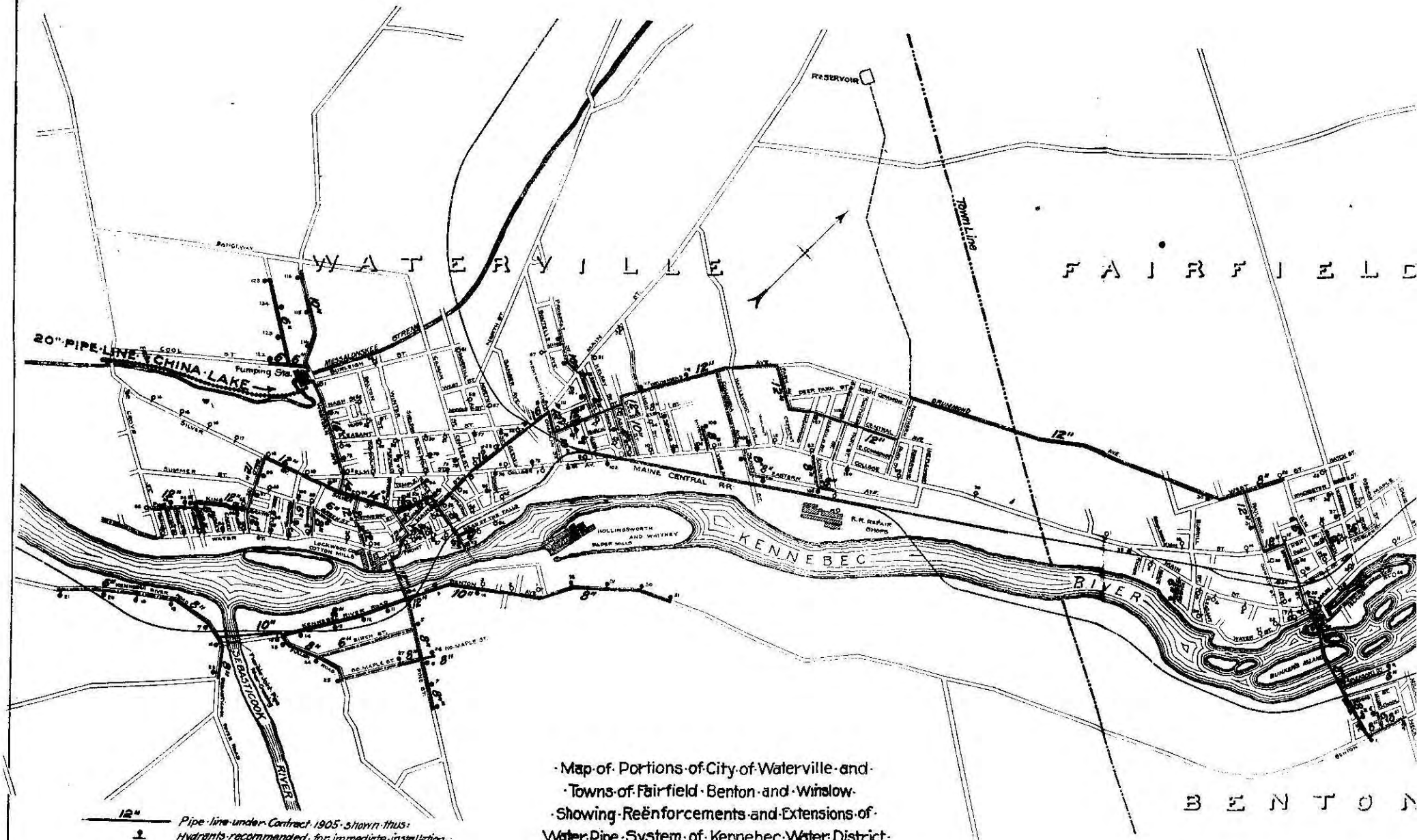
If we assume 3% for slip and leakage··· Duty = 52,730,000 . . . 1000# . } Note the short period of test.
If we assume 5% for slip and leakage·· Duty = 51,640,000 . . . 1000# .

Note: Boiler test was not made upon May 13, 1905. The above observations relating to coal and steam consumption covering the two tests conducted upon May 13, are available.
Total time = 8 h.–15 m. Total coal burned = 4217 pounds. Net feed water used on two tests = 34 002 pounds
Deduct total ashes = 267 . Add . . . between tests = 1 322 .
Net fuel used = 3950 . Add condensation in separator = 384 .
Total evaporation = 35 708 .

Total steam evaporated per pound of coal from 52.8° Fahr. = { 9.03 lbs. / 8.94 deducting separator water }
Total . . . . . from and at 212° Fahr. = { 10.93 lbs. / 10.78 deducting separator water }

629.
C.
184.


PLAN OF CHINA LAKE PIPE LINE LOCATION
KENNEBEC WATER DISTRICT
WATERVILLE ME.
May 29 1905
Scale
Leonard Metcalf
Supervising Engineer
14 Beacon St
Boston Mass
WATERVILLE
Sebasticook River
Winslow Station
Maine Central R.R.
Elm
Pumping Station
Western Ave
Silver
Summer St
Water St
Gove St
Cool St
Oakland Road
Messalonskee Stream
Stanley Road
KENNEBEC RIVER
Winslow
R.R.Sta.
Narrow Gauge R.R.
North Vassalboro Road
X Roads
Kennebec River
WINSLOW
Wiscasset Waterville and Farmington R.R.
Narrow Gauge
Road
Outlet Stream
Depot St
Pipe in Highway
East Vassalboro Road
North Vassalboro R.R.Sta.
Junct. 24" & 20" Pipe
Town Line Winslow Vassalboro
Drummond Road
Head Line One Mile from Kennebec River
VASSALBORO
magnetic North
To M.C.R.R. Station Vassalboro
X Road
Bean's Mill
Outlet Stream
Pipe in Highway
Highway
East Vassalboro R.R.Sta.s
CHINA LAKE
Highway
535. C. 180.



12" Pipe line under Contract 1905 shown thus:

Hydrants recommended for immediate installation.

Hydrants recommended for installation in the near future.

10" New Pipe Lines required for supplying last named hydrants or for desirable reënforcements or extensions which may become imperative in the near future.

Old Hydrants.

Present Pipe System not shown

Map of Portions of City of Waterville and Towns of Fairfield Benton and Winslow Showing Reënforcements and Extensions of Water Pipe System of Kennebec Water District Waterville Me.

June 1 1905

Thomas Hilliard
Supervising Engineer
14 Beacon St
Boston Mass

MAP TRACED FROM MAP OF WILLIAM HILL, CONSULTING ENGINEER

TABLE 13

Canvass of Bids Received June 4, 1904, for furnishing Valves and Hydrants

	Size.	Number required.	M. J. Drummond & Co.		Rensselaer Mfg. Co.		Darling Pump & Mfg. Co.		Chapman Valve Mfg. Co.		Eddy Valve Co.		The Fairbanks Co.		R. D. Wood & Co.		Coffin Valve Co.		Ludlow Valve Mfg. Co.	
	Inches.		Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.	Price.	Amount.
Gate Vavles, Iron Body, Bronze Mounted, Double Faced	20	6	$107.85	$647.10	$110.00	$660.00	$103.50	$621.00	$107.75	$646.50	$103.00	$618.00	$107.00	$642.00	$165.00	$630.00	$100.00	$600.00	$110.00	$660.00
	16	6	73.50	441.00	65.25	391.50	68.00	408.00	64.00	384.00	68.00	408.00	67.00	402.00	68.00	408.00	59.00	354.00	72.00	432.00
	14	2	62.85	125.70	56.00	112.00	56.80	113.60	53.00	106.00	55.00	110.00	57.00	114.00	48.00	96.00	45.00	90.00	64.00	128.00
	12	20	32.00	640.00	29.50	590.00	30.30	606.00	31.00	620.00	30.40	608.00	31.00	620.00	31.50	630.00	33.00	660.00	36.00	720.00
	10	10	21.95	219.50	22.30	223.00	23.90	239.00	22.75	227.50	22.80	228.00	23.00	230.00	25.00	250.00	26.00	260.00	26.00	260.00
	8	20	15.50	310.00	16.00	320.00	16.60	332.00	15.65	313.00	16.50	330.00	16.00	320.00	17.00	340.00	17.50	350.00	17.95	359.00
	6	20	9.70	194.00	10.35	207.00	11.15	223.00	9.70	194.00	10.75	215.00	11.00	220.00	11.75	235.00	10.95	219.00	11.95	239.00
	4	10	6.20	62.00	6.15	61.50	6.66	66.60	6.75	67.50	7.50	75.00	7.25	72.50	7.00	70.00	7.00	70.00	7.65	76.50
	3	10	5.00	50.00	4.50	45.00	5.70	57.00	5.20	52.00	5.00	50.00	5.25	52.50	5.75	57.50	5.75	57.50	6.50	65.00
	2	10	-	-	2.50	25.00	2.80	28.00	2.45	24.50	2.75	27.50	3.15	31.50	4.00	40.00	4.25	42.50	3.15	31.50
	1	10	-	-	1.00	10.00	1.00	10.00	1.00	10.00	1.00	10.00	1.12	11.20	-	-	1.75	17.50	1.17	11.70
Sluice Gates	24	2	-	-	85.00	170.00	98.00	196.00	51.00	102.00	100.00	200.00	85.00	170.00	120.00	240.00	115.00	230.00	78.65	157.30
Air Valves	1	12	-	-	12.00	144.00	9.00	108.00	22.00	264.00	16.00	192.00	21.00	252.00	11.00	132.00	22.00	264.00	21.15	253.80
Relief Valves	6	2	-	-	32.50	65.00	24.00	48.00	30.60	61.20	30.00	60.00	30.00	60.00	60.00	120.00	75.00	150.00	29.25	58.50
Total for Valves	-	-	-	*$2,689.30	-	$3,024.00	-	$3,056.20	-	$3,072.80	-	$3,131.50	-	$3,197.70	-	*$3,248.50	-	$3,364.50	-	$3,452.30
Hydrants †	-	50	$35.00	$1,750.00	$30.00	$1,500.00	$34.50	$1,725.00	$31.25	$1,562.50	$27.75	$1,387.50	$29.00	$1,450.00	$36.00	$1,800.00	$29.50	$1,475.00	$33.00	$1,650.00

* Bids incomplete.

† With 5-inch valve and not less than 6 ½-inch standpipe.