

THE TOWN AND CITY OF WATERBURY,
CONNECTICUT, FROM THE ABORIGINAL
PERIOD TO THE YEAR EIGHTEEN HUNDRED
AND NINETY-FIVE.

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CHAPTER VII.

WATER SUPPLY AND SEWERAGE—THE FIRST CONDUITS—PROTECTION FROM FIRE UNDER BOROUGH GOVERNMENT—PRIVATE SYSTEMS—THE REJECTED PROJECT OF 1856—SPRINGS OF BROWN & BROTHERS—CHARTER OF 1867—THE RESERVOIRS AND THEIR SOURCES—DAMS, PIPES, EXTENSIONS—COST OF THE WHOLE—PUMPING FROM MAD RIVER—LATER PROJECTS—THE NORTHERN SOURCE OF SUPPLY—ITS ADOPTION IN 1893—THE WORK IN 1894—IMPORTANCE OF SEWERAGE—THE ACT OF 1881—SEWER COMMISSIONERS—THE PLAN ADOPTED—THE WORK AS COMPLETED IN 1884—CITY ENGINEERS.

WATERBURY in earlier days was by no means deficient in its water supply. Clear streams flowed over pebbly beds in places where now we find paved streets and electric railway tracks; and there are those who remember when Centre square, now shaded by stately elms, was a swamp, where in childhood they gathered blue-flag if not lilies. Springs were numerous, and nearly every householder had one on his premises; but wells were in general use, and were the main dependence of the town during the first century of its existence, passing in successive periods through various forms, from the pliant pole dip and oak bucket to the more complex windlass, with crank and chains, and the ordinary pump.

The first attempt to obtain water for domestic uses by means of conduits was made sometime between 1800 and 1805. A spring was opened near the northeast corner of Grove and Willow streets, and water was conveyed to the premises of Bennet Bronson, John Kingsbury, Elijah Hotchkiss and others, on Willow and West Main streets.

In 1825 the village of Waterbury, following the well known proclivities of Connecticut villages, became an incorporated borough. With its newly acquired municipal strength there was still little activity in the way of public improvements; the code of by-laws was notably limited, each one being enacted only as occasion required. There was no official action in the matter of providing for the extinguishment of fires until 1830. In that year the first fire company was formed, in accordance with a vote passed by the wardens and burgesses, "that it was expedient to secure the citizens of the borough from damage by fire." The equipments of

this company, including probably the fire engine, were furnished by subscription. Water to supply the engine was taken from the nearest wells, cisterns and streams, and was carried in pails to fill the engine box. A few years later a pump well, for fire purposes, was built on West Main street at what is now the foot of Prospect street. As no mention is made of this well in the borough records, nor of one or two known to have been in use in other localities, they were doubtless built by private enterprise.

In 1844, the borough laid a tax for various purposes, one of which was to construct reservoirs, and appointed a committee to superintend the expenditure of the money raised by said tax. These reservoirs were presumably for fire purposes, and it is probable that the first reservoir at the east end of the Green, and the one on West Main street, between Holmes and Central avenues, were built at this time.

The hillsides near the centre of the borough abounding in springs that yielded sweet waters, small private water systems were easily constructed. In 1847, A. S. Blake laid pipes from a spring on Cooke street to his house on Grand, and furnished water for several other residences. In 1849, J. C. Booth and D. F. Maltby opened a spring at the upper end of Prospect street, which is now owned and used by F. J. Kingsbury. The same year J. M. L. and W. H. Scovill built the Long Hill aqueduct, a line of pipe conveying water from a spring in the northeastern part of the borough, near what is now Farm street, to the centre, by which the Scovill house and families in its vicinity were supplied.*

About this time there was an increasing demand for improved methods and a larger supply of water for the extinguishment of fires. Two or three borough meetings were held to consider "the purchasing of new fire engines and other fire apparatus," but the money for the estimated expense could not be raised either by tax or by subscription. A committee, however, was appointed to apply to the next General Assembly for a charter to form a water company, which should furnish the borough a full water supply. This charter, if applied for, was never granted. Meanwhile the number of private water systems continued to multiply, and the urgent needs of a more abundant supply for manufacturing and other business purposes became apparent. In 1852, the Scovill Manufacturing company conveyed water in pipes from a spring on Long hill, near Walnut street, to their factory on Mill street.

* There was a spring of most excellent water within a few feet of where the office of Dr. Bland, veterinary surgeon, now is. I think that at one time it supplied a few families near Exchange place. I gathered water crosses in the stream that flowed from this spring after 1860.—H. F. B.

Other manufacturing companies increased their supplies in similar ways. The same year the borough made another attempt to obtain a larger supply, ostensibly for fire purposes, but the committee appointed to examine and consider the matter made no report.

Waterbury had outgrown borough government, and at a meeting of citizens it was voted to apply for a city charter, which, on application, was granted by the legislature in 1853.

The introduction of water into the city in such a manner and in such quantities as should furnish an adequate supply for all needs continued to be a subject of general agitation, the citizens feeling that they now had the power to act effectively as well as wisely. In 1854, larger projects for family use were undertaken by individuals. J. C. Booth and S. W. Hall purchased a spring in the northern part of the city, and built reservoirs from which they conveyed water to residences on Church street. Later a spring was opened further south, in a lovely bit of woodland bordering on Pine street, by H. W. Hayden. Both are still in use. This section of the town abounds in cool, sweet springs, which are utilized for household purposes by residents of Hillside avenue and vicinity.

In 1856, stimulated to action by the example of neighboring boroughs, the citizens called a meeting to discuss the water question and consider a plan proposed by some of the leading men of the town. A committee was appointed to investigate the practicability of the proposed plan, and report at a future meeting which they were authorized to call. Within a month the committee had completed their work, and called the meeting, which was largely attended; but to the surprise of the committee the meeting refused to hear any report whatever on the subject. Explanations and expostulations by the friends of the movement were of no avail; an adjournment *sine die* laid the matter aside temporarily.

In 1859, on application to the legislature, a charter was granted to N. J. Welton, F. L. Welton and John Osborn to take the water of any stream or spring west of the Naugatuck river, and lay pipes for the conveyance of the same to any desired point, for domestic and public uses. The works were built by John Osborn, and conveyed with all chartered rights to Brown & Brothers. Later, Brown & Brothers bought land, opened springs and built reservoirs in the northern section of the city, near Cooke street, and furnished water for family and other uses.

On August 1, 1866, the Court of Common Council, having listened to a forcible presentation of the subject in an address by Mayor Rockwell, appointed a committee (in which two prominent members of the committee of 1856 were included) to make the investigations

necessary for carrying out the project of obtaining a good and abundant water supply. The city, situated within a long, narrow basin of elevated watersheds, flanked by wooded hills, had admirable advantages for obtaining an ample supply by gravitation, and its steep, neighborly declivities afforded unusual facilities for easy and rapid transmission. The committee, after a thorough examination of the three principal sources within reasonable distance of the city (Quassapaug lake, Hancock brook and an East Mountain stream), and a careful consideration of the Artesian well system, unanimously recommended the East Mountain brook, the same source of supply which the committee of 1856 were prepared to recommend. In January, 1867, the Common Council accepted their recommendation, and on March 2 of the same year it was accepted by the legal voters of the city. Another committee was also appointed to examine and report to a future meeting of citizens certain matters of detail, namely, the amount of watershed, size of springs, reservoirs and dams, size and length of pipes and estimated cost of the entire work. This committee made their report on March 18, which was accepted, and a committee of ten appointed to apply to the legislature for a charter, and for power to issue bonds of the city of Waterbury, not to exceed the sum of \$150,000, for the purpose of raising the money necessary to pay the costs of the proposed works. A charter was granted giving the right to take streams, lands, etc., and to issue the necessary bonds, but with a clause making it valid only on its acceptance by the voters of the city. A meeting held May 27, 1867, resulted in a majority of 623 in favor of the act, 879 having voted for it, and 256 against it.* The charter provided that the Common Council should elect the first board of water commissioners, and N. J. Welton, F. J. Kingsbury, J. W. Webster and A. S. Chase were elected for one year. On May 30, 1867, the board was duly organized, N. J. Welton being elected president and engineer in charge of the works. McRee Swift, an experienced hydraulic engineer of New York, was subsequently called in consultation.

The engincers having perfected their plans, the board of water commissioners presented them to the Common Council on June 17. The plans were approved, and on July 11 the contract for building the two dams was awarded to Messrs. Martin & Shey, and that for furnishing and laying pipes, furnishing and setting fire hydrants, etc., to George H. Norman of Newport, R. I. The dams are of earthwork, with puddled walls in the centre. That of the distributing reservoir is 262 feet long, twenty-five feet high, fourteen

* See Chapter III, p. 42, for additional statements by the Hon. S. W. Kellogg.

feet wide on top and 100 feet and six inches at bottom. The reservoir covers a surface of three acres; its greatest depth is twenty feet and its capacity is eight million gallons; its elevation above Centre square is 225 feet.

The dam of the main, or storage reservoir is 360 feet long, thirty feet high, fourteen feet wide on top and 119 feet at bottom. This reservoir covers a water surface of about thirty-five acres; its

DISTRIBUTING RESERVOIR.



greatest depth is twenty-five feet and its capacity is one hundred million gallons.

COOKE STREET RESERVOIR (SEE PAGE 98).

On January 2, 1868, the lower dam being completed, and eight miles of pipe ready for trial, water was let into the pipes with the most satisfactory results. The contract for dams and that for pipe laying, which was for twelve miles of wrought iron and cement, main and distribution, and one mile of service pipe, setting gates, hydrants, etc., was completed in July, 1868. In June the city had authorized the laying of four miles of additional pipe and the setting of several more gates and fire hydrants. This work, under contract to George H. Norman, was finished in October of the same year.

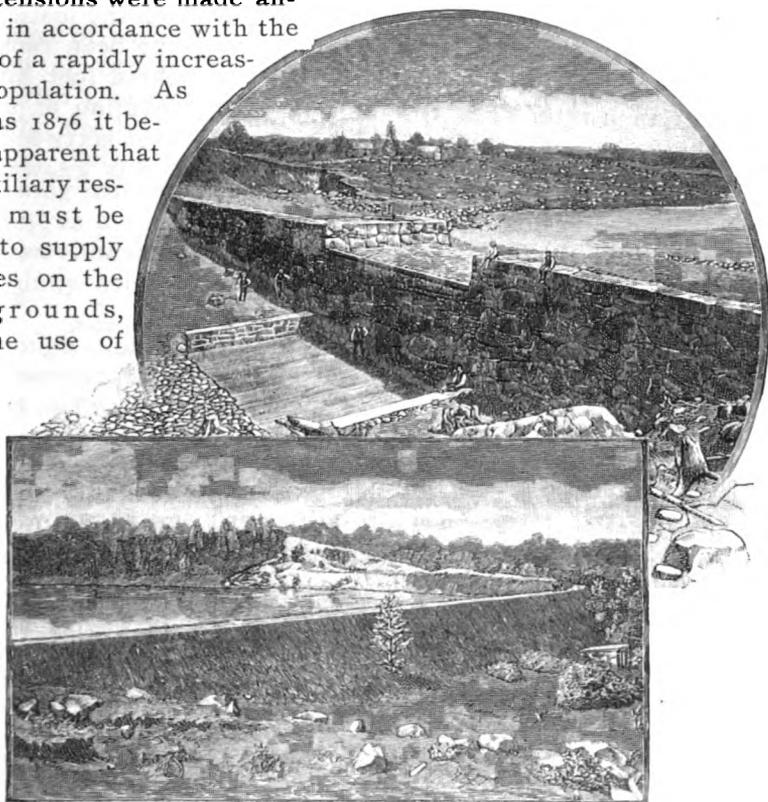
The appropriation for the first contract was \$150,000, and the cost of the work \$147,725. The appropriation for the second, for pipe

laying, etc., was \$25,000, the cost \$23,792. The appropriations were made in accordance with the estimates of the board of water commissioners, and, as is seen, more than covered costs,—a result not usual in municipal affairs.

East Mountain brook, the source of the city water supply, rises in clear mountain springs, and before it was appropriated to its present use, flowed over meadow lands for some distance to where the upper dam now is, and thence over a rough and rocky bed, with a descent of 175 feet, to the site of the lower dam. Chemical analysis of the water shows it to be of more than average purity. Its excellent quality is fully appreciated when it is compared with that of other cities.

Extensions were made annually in accordance with the needs of a rapidly increasing population. As early as 1876 it became apparent that an auxiliary reservoir must be built, to supply families on the high grounds, for the use of

THE PROSPECT RESERVOIR, 1881.



THE EAST MOUNTAIN RESERVOIR (SEE PAGE 95).

the city in case of accident to the main pipe, and as a reserve in case of an extensive conflagration. In 1879, the city bought the north section of the water works built and owned by Brown &

Brothers, and the lands and rights necessary for the construction of the proposed auxiliary reservoir. This, known as the Cooke street reservoir, was built and connected with the main system in 1880. The dam is of earthwork, the elevation is the same as that of East Mountain, and its capacity is ten million gallons. On several occasions the entire city has been furnished temporarily from this reservoir, a fact showing the wisdom of the commissioners in thus providing more than one means of distribution. Had a fire occurred on either of these occasions the value of the Cooke street reservoir would have been made patent to all citizens. The necessity of immediately increasing the storage capacity of the water works having become evident, a mill privilege, with a small store of water and certain lands adjacent, was purchased in 1880 and connected by a twelve inch pipe with the main storage reservoir. Three years later, the old dam having been removed, a new dam was built of solid masonry, twenty-three feet high and 250 feet in length. The reservoir is at an elevation of fifty-five feet above the main storage, and has a capacity of sixty-seven million gallons. It is in the town of Prospect and is known as the Prospect reservoir.

The cost of the entire additional supply was as follows:

The purchase of Brown & Brothers' water system,	\$ 9,600
Lands, rights and cost of construction of Cooke street reservoir,	30,878
Lands, rights and cost of construction of Prospect reservoir,	21,573
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Total,	\$62,051

In 1883, the Prospect reservoir not having been completed in time to store water from the spring rains, and the drought of the summer having been unusually protracted, the supply was nearly exhausted by the middle of November. The engineers of the water works at once perfected a plan for pumping from Mad river directly into the large main pipe. The requisite buildings were erected and the machinery was put in and in working order within ten days. Pumping was continued as needed until May, 1884, when the reservoirs were again full. The station, lands and buildings with pump, boiler and all connections, cost nearly \$3500.

About this time the commissioners became fully aware that the city had reached the hilltops, and that a higher service must be provided, that consumption had outgrown the capacity of the reservoirs, and that another and much larger source of supply must be sought. In 1867, when the water works were built, the population of Waterbury was less than 10,000; in 1880, it was 15,000, and in

1890 about 30,000, a growth in population not anticipated by the most sanguine faith in the city's future. The commissioners reported their findings, the steadily increasing consumption, the inadequacy of the supply, etc., to the Common Council, and were authorized to make preliminary surveys and estimates of costs, with a view to ascertaining what could be done in the way of increasing the supply. Their engineers made said surveys and estimates, and the commissioners reported the results from time to time until 1889. At this time they were directed by the Common Council to make special surveys and estimates of the respective cost of each of the four sources of supply found to be available, namely, Hop brook, Lindley brook, Chestnut hill and Quassapaug lake. After thoroughly examining and duly considering the special advantages of each as to purity of water, storage capacity, facility and cost of construction, they unanimously recommended Hop brook, with Quassapaug lake as a sometime future addition if it should be needed. But the Common Council took no immediate action on their recommendations. The water supply in its best estate being insufficient for the requirements of the city, it became necessary, as a supplement to it, to resort again to pumping from Mad river. Pumping from the river into the mains, as needed to supply daily consumption, has been continued up to the present time.

Although the Hop brook source of supply had been unanimously recommended by the commissioners, their decision was not regarded as final. A special committee was appointed by the Common Council to make further investigations. The services of Rudolph Hering, C. E., were engaged, and under his direction elaborate surveys were made of all the various sources previously considered. On June 6, 1892, Mr. Hering presented a clear and noteworthy report, which was published and widely circulated. It left the Common Council divided, however, in regard to the best source of supply, and a discussion followed which was not terminated for several months. But at a meeting on March 6, 1893, Mr. R. A. Cairns, the city engineer, laid before them a communication in which he said :

During the past year the discussion has been upon the relative merits of certain sources of supply, commonly designated as the eastern or Wolcott source and the western or Watertown and Middlebury source. I desire to invite your attention to another and distinct source, which I will for convenience designate as the northern source.

The source indicated was the stream which empties into the Naugatuck on the west side at a point a little south of Reynolds

Bridge, commonly known as "the Branch." This proposal was received with great satisfaction by the Common Council, as it provided a way of escape from the serious difficulties which were recognized by one side or the other as inherent in the other places.

A few days later, the Common Council and the water commissioners visited the region to which their attention had been turned, and were so impressed in its favor that at a subsequent meeting the recommendation of the city engineer was adopted, and application was made to the legislature for authority to take water from this northern source and to issue the necessary water bonds. The bills were passed in April, 1893, and a special committee was appointed by the Council to carry forward the enterprise (known as the "Committee on an Additional Water Supply"), consisting of R. A. Cairns, city engineer, L. F. Burpee, city attorney, T. D. Barlow and E. B. Reiley, aldermen, Jay Hart, M. J. Daly, John Fitzpatrick and T. L. Sanford, councilmen, and Christian Hauser, F. B. Rice, H. L. Wade and J. W. Webster, who were not otherwise connected with the city government. Of this committee the chairman, *ex-officio*, was Mayor D. F. Webster, whose birthplace was near the head waters of the "Branch," who was thoroughly familiar with the entire region from which the water supply was to be derived, and who was specially fitted, for these and other reasons, to render practical service in the development of the enterprise. Under the direction of this special committee exact surveys were begun, and it was determined to build works of so great magnitude that, with occasional additions to the storage capacity, the question of a water supply would be settled for many years to come. The plans adopted comprised a masonry dam, eighty feet in height above the bed of the stream and about 600 feet long, with an earth dam to close a small side valley, together forming a reservoir covering an area of 105 acres, with a storage capacity of over 600 million gallons. From this reservoir, a conduit of cast iron pipe, thirty-six inches in diameter, was to extend to the corner of West Main and North Willow streets, a distance of almost exactly ten miles. It was decided, however, for the time being, to carry the dams only to a height sufficient to secure a storage capacity of 315 million gallons, but at the same time to build them of such proportions that they could at any time be carried to the full height for which they were designed. The estimate of the city engineer on these plans, exclusive of damages for the diversion of water, was \$750,000. The plans as submitted by the special committee were adopted by the Common Council, May 1st, 1893. Negotiations were afterward completed with owners

of lands and buildings within the area of the reservoir and along the route of the pipe line; contracts were made with various parties for the masonry, the pipe and the laying of the pipe, and work upon the new enterprise was begun. At a meeting of the Water Supply Committee, September 4, 1894, the city engineer reported that seven miles of pipe line had been constructed, and that the work on the dam was making good progress.

At the time of beginning work on the northern supply—1893—the system of water-works consisted of four reservoirs, of an aggregate capacity of 185 million gallons, and a pumping station on Mad river with a pumping capacity of two million gallons per day, about forty miles of main and distribution pipe, 365 gates, and 264 fire-hydrants, of which 222 are owned by the city and forty-two by private individuals and corporations.

The pipes which were laid in the beginning were of wrought iron and cement, of which some are still in use; but the main has been relaid with cast-iron, and all extensions and relayings of the last few years have been with cast-iron pipes.

The annual rates for the use of water are made on the *pro rata* plan for families, and by metre for miscellaneous uses and large consumers. The following figures will afford some idea of the cost of the old system, and of present annual receipts :

Cost of the water system as now operated (December 31, 1893), including all extensions,	\$553,000.
Paid by issue of water bonds,	265,000.
Paid by the city treasurer,	288,000.
Receipts for water rents for the first year, 1868,	3,423.
Receipts for 1893,	78,699.

The water works are by charter under the management of a board of water commissioners, with a president who is also superintendent, and is the only member of the board that receives any compensation. It is independent in matters of detail and general management of work and of finances, but the Court of Common Council is the referee and sole authority in all extensions, enlargements of supply and appropriations. N. J. Welton was the first president. He was elected in 1867, as already noted, and has been president continuously from that date till the present time, with the exception of two years, when O. H. Stevens was president; but there was no change in the working of the system or the general management during this gentleman's term of office. The board being non-partisan, it has been able to utilize the advantages of long service in the same department, appropriating the knowledge

and skill gained by experience. This has resulted in making the water works not only self-supporting, but a source of revenue to the city.

The early struggle for the admittance of water into the city by the plan finally adopted was long; and it is fitting to recall the earnest and untiring exertions for its success of Mayor Rockwell. His name should be recorded here in grateful remembrance. Mr. Stevens served as water commissioner, including two years as president, for twelve years, and much of the success of the management during that time was due to the wise counsel and faithful services rendered by him. Captain D. B. Hamilton was a member of the water board for eighteen years. His thorough knowledge and intelligent views on all matters connected with the works have been of great value to his associates. W. W. Bonnett, C. E., the present efficient clerk, has held the position since 1873.

The officers of the board of water commissioners December 31, 1893, were as follows:

Nelson J. Welton, president.

Frederick B. Merriman, secretary.

David B. Hamilton, James A. Hynes, Frederick B. Merriman, George Panneton,
board of water commissioners.

Messrs. Welton and Bonnett, engineers.

THE SEWERAGE SYSTEM.

The need of a system of sewerage in Waterbury was little felt in the primitive days of its history. It had natural facilities for good drainage—a varying but not too uneven surface, and an unusually porous and consequently dry soil. Besides, several rapid streams, especially swift when increased in volume by a recent rainfall, served as convenient conduits for accumulating surface water and whatever sewage was turned into them. As the population increased these streams were used for sewerage purposes to a much greater extent than was desirable for either comfort or health.

After the introduction of water into the city by the system known as the City Water Works, the question of sewerage became an important one, sanitary conditions obviously demanding some immediate action. The manifest needs of a continually increasing population and the necessity for municipal action in the matter were repeatedly urged upon the attention of the Court of Common

Council. There was, however, no visible result until nearly ten years after the introduction of water into the city.

On February 12, 1877, the following vote was passed :

Voted, that the Court of Common Council of the city of Waterbury hereby petition and pray the General Assembly of this state for authority to issue bonds of the city to an amount not exceeding \$100,000, for sewerage purposes.

The petition was granted by the legislature on March 22, subject to the approval of the legal voters of the city, but on June 20 the citizens rejected the act of the legislature, by a vote of 964 to 304. Nothing further was done until March 7, 1881, when the Common Council voted that Mayor Parsons and Aldermen Earl Smith and C. B. Webster, with Councilmen Thomas Fitzsimons and J. J. McDonald, be appointed a committee to confer with the city attorney, S. W. Kellogg, to recommend a suitable bill to provide a system of sewerage. A bill was presented to the legislature, and an act empowering the city to build and maintain sewers, and granting authority to issue bonds, not to exceed \$100,000, for sewerage purposes, was passed April 14, 1881, and became effective at that date. The act provided for a board of Sewer Commissioners, composed of the Mayor, the Road Commissioners, and two others to be elected by the Common Council. The first board of Sewer Commissioners, organized April 19, 1882, consisted of Mayor Kendrick, president *ex-officio*, Earl Smith, Thomas Fitzsimons, Thomas Martin, George Tompkins, L. I. Munson and Samuel Atwater.

At the first meeting of the board, L. I. Munson and the street surveyor, N. J. Welton, were appointed a committee to secure such information in regard to sewerage systems in other cities as seemed desirable, and to confer with expert engineers with a view to obtaining a plan suited to meet the present and prospective requirements of the city. Among those conferred with was Rudolph Hering of Philadelphia, an eminent civil and sanitary engineer, who spent several days with the street surveyor looking over the ground, examining its condition and noting various details. Mr. Hering presented a comprehensive plan, which was approved by the Commissioners, and by them recommended to the Common Council.

The plan considered primarily the location of the outfalls necessary for the discharge of the sewage. The stream formed by the confluence of the Naugatuck and Mad rivers was regarded as large enough to receive it at that time, without seriously affecting the towns below, but the probability was recognized that the city would in a few years be compelled to purify the sewage, and the open tracts of

land below the city were pointed out as well adapted for doing this by means of filtration.

The city is naturally divided by the Naugatuck and Mad rivers into three sections: the Abridgor, "Brooklyn" and the city proper. Each of these districts was to have a separate outfall into the Naugatuck. The outfall of the Abridgor was to be below the junction of Mad river with the Naugatuck, although temporary outfalls at different points along Mad river were considered practicable for present use. For the Brooklyn district a temporary outfall at the foot of Bank street was recommended, but when the discharge from this outfall into the pool above the Benedict & Burnham dam should become troublesome the outfall must be changed to some suitable point below the dam. The outfall for the city proper was located at the foot of Benedict street, with the understanding that in case of future trouble from the pollution of the pool above the Benedict & Burnham dam, an iron pipe should be sunk in the bed of the river and carried down through the dam, to convey the sewage to some favorable point below to discharge into the current of the stream.

The plan provided in the main for sewers according to the separate system, although in most cases such sizes were recommended as would accommodate part of the rain water, for the twofold purpose of relieving the streets and aiding in flushing the pipes. The minimum size advised for pipe sewers was eight inches in diameter, and the maximum eighteen inches, their shape to be circular. All sewers of larger size were to be built of brick, the minimum dimensions to be eighteen by twenty-seven inches, and their shape semicircular, or egg-shaped. In all places where practicable the sewers were to be laid below the level of cellars, and the grade was to be such as to give a mean velocity of three feet per second. Man-holes or lamp-holes in pipe sewers were to be placed from 150 to 200 feet apart and also at all changes of direction and grade; in brick sewers they were to be from 200 to 300 feet apart. Changes in the direction of pipe sewers were to be made wholly within man-holes, and in brick sewers by large curves in the line. Storm water not let into the sewers, or allowed to flow over the ground surface into brooks, was provided for by underground channels and special culverts.

For pipe sewers, vitrified clay well glazed was recommended, and for the construction of brick sewers general directions were given, emphasizing the importance of smoothness of interior surface, the use of hard-burnt, regularly shaped brick, and cement sufficiently strong to ensure great hardness; and, should the ordinary self-cleaning process prove not sufficient, directions were given for artificial cleaning by flushing.

The Common Council adopted the report of the Commissioners, and approved Mr. Hering's plan, September 18, 1882. By direction of the municipal board the street surveyor at once proceeded to make the necessary surveys, estimates and maps, with the proper drawings for main sewers, terminal chambers and such man-holes and catch-basins as would be required, and to draft proper specifications and contracts for the building of the works. The work was prosecuted with all possible diligence and was ready for submission early in March, 1883. To avoid trouble from discharging sewage directly into the river at the foot of Benedict street, the quantity there being greater than from any other outfall, it had been decided

to lay the cast iron pipe in the bed of the river, as proposed in Mr. Hering's plan, at the time the main sewers were built. Bids were opened April 12, 1883, and the contract for about two miles of brick sewers was awarded to William E. Dean of New York, and that for 600 linear feet of cast iron pipe, to be laid in the bed of the river, to Wellington & Madden of Waterbury. On April 28, following, N. J. Welton, street surveyor, was appointed engineer for the construction of the main and outfall sewers and all other sewers built during the year, and Mr. Hering consulting engineer. Mr. Welton was authorized to employ on the part of the city such other engineers as in his judgment were needed, and later secured the services of F. Floyd Weld, C. E., of New Haven, who proved a valuable acquisition to the engineering department.

The largest brick sewer, four feet and three inches by two feet and ten inches, was laid in Benedict street, at a depth of eighteen feet below the surface of the street. The terminal chamber at the foot of the street was one of the most important pieces of work done during the construction of the works. An overflow from it conveys all surplus water directly into the river, thereby diminishing the volume of drainage to be carried by the cast iron pipe to the outlet below the Benedict & Burnham dam. In Meadow and South Main streets, which cross Great brook, the sewers were necessarily built beneath the bed of the stream, and difficulties were encountered; in South Main street the stone arch over the brook had to be removed and replaced. At the corner of Willow and West Main streets a cut twenty-three feet deep was necessary. The work of building the main sewers and the various appurtenances therewith connected was commenced in May 1883, and completed in January 1884. The Common Council having directed the building of certain lateral pipe sewers, a contract for 3600 linear feet of vitrified pipe, with the necessary catch-basins, man-holes, etc., was made with Moses S. Austin of New Britain. The work was begun October 1, 1883, and completed at the end of the year.

The construction engineer, in his first annual report, urged upon the consideration of the Sewer Commissioners the necessity of positive and stringent rules regarding house-drainage, insisting on the employment of inspectors well instructed in sanitary law, and of licensed and bonded plumbers only, closing with the prediction that "any compromise in these matters will be felt, sooner or later, in a direful condition of sickness and mortality." Mr. Hering in his report on the completion of the main sewers expressed satisfaction with the work, and presented in a forcible manner the subject of proper house-drainage, pointing out the measures and

methods necessary to secure the benefits of a well constructed sewer system.

An act of the legislature amending the city charter so as to provide for sewer assessments was passed March 20, 1884. The amendment directed the Common Council to obtain an estimate of the probable total cost of building sewers, main and laterals, in all the open and accepted streets of the city, to ascertain the actual total frontage in feet of all property upon said streets subject to assessment, and make a uniform assessment per linear foot of frontage of a fixed and determinate sum, which in the aggregate should not be less than two thirds of such cost. The street surveyor made the necessary surveys, estimates of probable cost, and total measurements of frontage, and reported to the Sewer Commissioners. On the basis of this report the Common Council fixed as the uniform assessment for sewer purposes the sum of one dollar and fifty cents per linear foot of frontage, for all persons owning property subject to assessment. The amendment of the charter further provided, that the Commissioners should appoint a city engineer, who should hold his office for a term of three years, and that after such appointment had been made the office of street surveyor should terminate. Mr. F. Floyd Weld was appointed city engineer for three years from July 1, 1884, and at the expiration of that time was reappointed for a second term.

In 1884 a brick sewer was built through Scovill, Spring and Brown streets. The work was difficult, for it was necessary to pass under Great brook twice, and in the second instance to follow the course of the stream in a curve for some distance. The portable flushing-tank constructed that year was found to work well in connection with the stationary tanks already in use. In cleaning the sewers a deplorable state of misuse of them was revealed, and the enforcement of stringent regulations was urged upon the municipal authorities by the city engineer. In 1888 it was found to be necessary to build the intercepting sewer on River street, as provided for in Mr. Hering's plan. Four sewers were discharged into the shallow water of Mad river, causing a state of affairs wholly undesirable. This intercepting sewer was to convey all sewage then discharging into Mad river to an outfall into the Naugatuck. It was an expensive piece of work because it involved so large an amount of deep rock cutting. The cut at the corner of River and Washington streets was thirty-two feet in depth.

Although in all cases the sewers were built by contract, the work was carried on under the eye of thoroughly competent inspectors employed in the interests of the city, and the fact that

none has been rebuilt or repaired is evidence that the work was well done.

The city engineers make, and keep in their office, maps, profiles and sketches of all sewer work. The record maps show the location, size, depth and house connections of each sewer. The assessment maps give the names of owners of property, all titles having been verified; also the frontage of property and depth to the rear.

A superintendent is employed, whose business it is to care for the entire sewerage system, including the inspection of house connections and the flushing and cleaning of sewers. Up to the present date, December 31, 1893, the sewers of Waterbury have been kept, usually, in excellent condition.

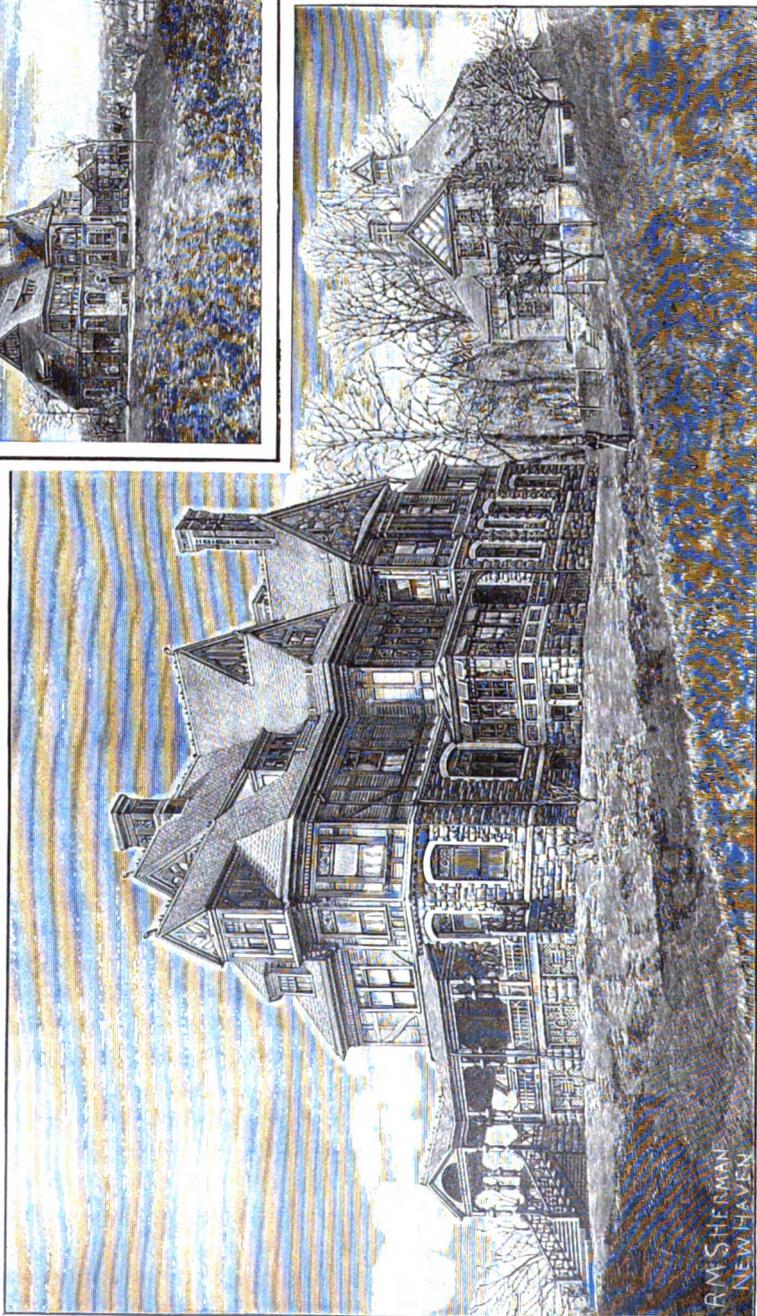
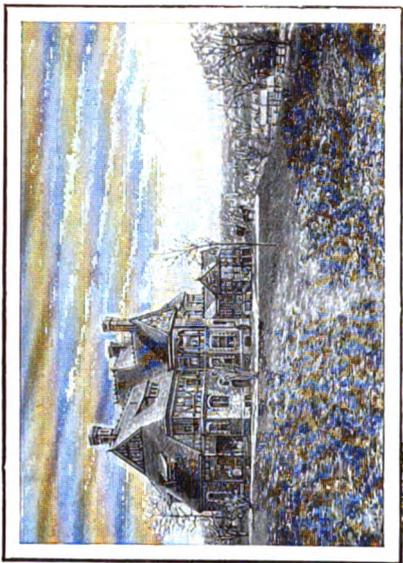
On June 17, 1890, Mr. Weld, who for six years had given intelligent, untiring and conscientious service to the duties of the office of city engineer, was stricken with a fatal illness, and died June 28. Frank W. Whitlock, C. E., who had been serving as assistant engineer, was appointed acting city engineer and took charge of the work until the end of the season. At this time the necessity of purifying sewage before its discharge into the Naugatuck was forced upon the attention of the Sewer commissioners by continual complaints from residents along the river below. During his term of service, Mr. Whitlock visited the city of Worcester, examined thoroughly the system of sewage purification there, and made an exhaustive report to the Commissioners.

Robert A. Cairns, C. E., the present efficient city engineer, was appointed to the office December 4, 1890. During the year following, an unusual number of sewer extensions was made, and additional information was gathered in regard to the important subject of sewage disposal. With the increase of the population and the consequent increase in the volume of the sewage, complaints have become more numerous and more insistent, and the necessity of adopting new methods more evident. The indications are that a new epoch in the history of the sewerage system of Waterbury has already been entered upon.

Up to the end of 1893 the cost of the sewer system, including its maintenance, was \$455,500. Other data are as follows:

Total length of sewers,	26 miles
Number of man-holes,	767
Catch basins,	248
House connections,	2459

NORTHWEST ELEVATION.



RESIDENCE OF N. J. WELTON, HILLSIDE AVENUE — SOUTHEAST ELEVATION.



Nelson J. Wilton

NELSON J. WELTON.

Nelson James Welton, son of Lyman and Minerva (Judd) Welton, is a lineal descendant of Richard Welton, who is reputed to be the first male child of European parents born in Waterbury, the date of his birth being September 27, 1679. Nelson James Welton was born in Waterbury, Buck's Hill district, February 15, 1829, in the house occupied by Richard Welton and his descendants from 1708 to 1840, the property having passed through six generations by inheritance.

The ancestors of Mr. Welton on both sides were staunch Episcopalians; on the maternal side he is the great-grandson of the Rev. Chauncey Prindle. He is a member and the senior warden of St. John's Episcopal church; was for fifty-two years in the Sunday School; thirty-two years a vestryman, and parish clerk from 1877 to 1889. He has been secretary and superintendent of the Riverside Cemetery association since 1853.

Mr. Welton is a civil and hydraulic engineer, and is a member of the state board of civil engineers. He was appointed surveyor for New Haven county in 1850; was street surveyor of the city of Waterbury for thirty-two years, and was engineer in charge of the construction of the city water works and of the city's system of sewerage. He has been president of the water board, with the exception of two years, since 1867. He has served the city and town in various other official capacities, and was representative to the General Assembly in 1861.

Mr. Welton is a prominent Free Mason; was made a Mason in Waterbury, February 14, 1856. He is a Knight Templar; a Past Eminent Commander of Clark commandery, No. 7, and a Past Grand Commander of the Knights Templars of Connecticut. He is also a "Scottish rite" Mason, being a member of La Fayette consistory, S. P. R. S. 32°, of Bridgeport.

In 1869 Mr. Welton married Frances R. P. Lyon of New York.

ROBERT A. CAIRNS.

Robert Andrew Cairns was born in Waterbury, December 2, 1859. After completing the course at the High school, he entered the Waterbury English and Classical school, and prepared for college. From the age of seventeen until twenty-one he served his apprenticeship as a machinist under his father, who was for many years one of the most skilled mechanics in the employ of the Waterbury Brass company. Having gained a good knowledge of this trade he entered the Rensselaer Polytechnic institute, at Troy, N. Y., and

was graduated with honor in 1885. He commenced practice in this city in 1882, and served during the following season as assistant to City Engineer Weld in the construction of the main sewerage works. From 1885 to 1887 he was connected with the Rensselaer institute as instructor in descriptive geometry and mathematical drawing, but resigned the position to take charge of the water works at Middletown, Del., an enterprise which he carried to successful completion. While thus engaged he also laid out and built the beautiful roads to the summit of South peak (1200 feet high) on the Billings estate at Woodstock, Vt. In the summer of 1887, in addition to his other engagements, he became connected with the Ludlow Valve Manufacturing company of Troy, and served them as engineer for two years. In 1889 he held the position of engineer of the water works at Centreville, Md., completing them in January, 1890. Resigning his position with the Valve Manufacturing company, he became a member of the firm of Hedden & Cairns, and engaged in the erection of iron and steel structures. As already mentioned, he was elected city engineer of Waterbury on December 4, 1890. In December, 1892, he was chosen a member of the Board of Health.

Mr. Cairns is well versed in his profession, and on different occasions has been called upon to deliver lectures upon scientific subjects. He is a member of the First Congregational church, and has been elected to various offices therein. In 1890 he married Mary Elizabeth Clash of Centreville, Md.