(Student Paper) (1) WATER WORKS

Reference

THE WAYLAND WATER WORKS

FROM

PAST TO PRESENT

By

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submitted to:

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INTRODUCTION

The Wayland Water Works was established in the year of 1878 for the purpose of providing the people of Cochituate (a segment of Wayland) with a dependable water supply. At this time in this small, thickly settled village of Cochituate there was some difficulty in obtaining a sufficient amount of pure water from private wells to supply the people and the public needs. So the people of the town voted to appropriate a sum of twenty-five thousand dollars for the construction of a suitable system to serve them. So was the beginning of the W.W.W., a system which since then has grown from a quaint village water supply into a strong, dependable and modern water works supplying over twelve thousand people. The purpose of this paper is to inform the reader of the development and progress of the Wayland Water Works in the past eighty-eight years, and also to give you a general understanding of how it functions.

ESTABLISHMENT OF WAYLAND WATER WORKS

In the year of 1878 the Wayland Water Works was established for the purpose of providing the people of Cochituate with a water supply from a storage reservoir. At this time the people of Cochituate were having trouble getting good water out of their wells. This was because the underground strata in the Cochituate area was thickly packed clay and water could not flow quickly enough through it to satisfy the needs of the public.[1] So finally on March 18, 1878 the town of Wayland took a vote on the questions of suppling Cochituate with water from a public reservoir and if the town should appropriate $25,000 for the construction of such a system that would be necessary. The people voted ^ yes, 9 no on the question of whether they should have a system, and ^ yes, no on the question if they should appropriate the said amount of money. The first thing they did was to appoint a water committee of five men: J. M. Bent, Charles H. Boody, Charles Fairbanks, R. H. Bryant, and James A. Bent, (J.M.Bent being the superintendent). The committee promptly chose "Snake's Brook" at Rice's Pond for the sight of the reservoir. A competent engineer, Mr. Hiram W. Blaisdell, was chosen to handle the construction along with R. D. Wood & Co. Contractors.[2]

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[1] First interview with Wayland Water Superintendent, Prentice Richardson, March 10, 1966.

[2] Town of Wayland, Report of the Construction Committee of Wayland Water Works, pp. 5-10.

The construction of the Reservoir began immediatdy and was completed by Labor Day of the same year. Hiram W. Blaisdell submitted a report on the construction of the Reservoir and system to the Town of Wayland on the completion of the water works. It included much information about the system and how it was built.

The capacity of the Reservoir is 16,000,000 gal. Its rainfall acreage is 435 acres. The twelve hundred people of Cochituate consume approximately 60,000 gal. per day that is about 50 gal, per person per day. The engineers knew that in the future years the dam would have to be raised so that the capacity would accomodate the growing population of Cochituate. The elevation of the Reservoir is about seventy ft. above the intersection of Lake Street (now known as route 30) and Main (now known as route 27).[1] Therefore the static head pressure was 31 p.s.i. (Static pressure is obtained by dividing the head,elevation difference, by 2.31).[2]

The dam is at the South end and is a 130 ft. long. It has a slope of 1½:1 and is fifteen ft. wide at the top. The dam was made with an earth center and has a cement headwall in front. Three pipes pass through the dam into the gatehouse; an eighteen inch cast iron pipe that comes directly in, a ten inch cast iron that runs through the filter gallery first, and a small wrought pipe put there before construction to keep the water level down.

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[1] Town of Wayland, Report of the Construction Committee of Wayland Water Works, pp. 15-20.

[2] Second interview with Wayland Water Superintendent, Prentice Richardson, March 28, 1966.

[3] Town of Wayland, Report of the Construction Committee of Wayland Water Works, pp. 21-23.

The filter gallery was made to filter out the large amounts of vegatation present in the water. It was a long stone filled ditch that ran along the east side of the reservoir into a ten inch pipe which inturn ran through the dam and into the gatehouse. When the filter gallery was being used it would supply the people with colorless, tasteless and odorless water.[1]

"The gatehouse is a substantial stone building, with brick corners and slate roof, neat in design and very ornamental."[2] Two pipes fed into the gatehouse, one was the eighteen inch direct flow and the other was the ten inch pipe from the filter gallery. On the bottom floor of the two floor gatehouse there was a set of valves that distributed the water. A fire turbine bought from Boston secondhand for $1,150, was fed by the eighteen inch pipe and when turned on during a fire would increase the head to twice the normal head.[3]

The water flowed southwest down from the gatehouse over Rice's, Lee's, and Loker's land to the intersection of Lake St. and Plain, that is 5,873 of ten inch main. Here is where the pipe first forks and a ten inch runs up each road until they intersect at Main. At Plain and Main the pipe branches into a eight inch up Main toward Lake and a six inch pipe up Plain until it reaches German Hill Rd. where it turns 90° and goes up German Hill as a four inch pipe. Finnally German Hill meets Lake St. and this makes it a closed circuit. The pipes used in the small roads that are enclosed by

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[1] Town of Wayland, Report of the Construction Committee of Wayland Water Works, p. 22.

[2] Ibid, p. 10.

[3] Ibid, pp. 22-24.

these four major roads are made of tar coated wood. All of the cast iron pipes had W.W.W. written on them and all of the pipes were five feet below the surface to protect from frost. Every pipe was inspected by Geo. W. Whitman and not one imperfect pipe was layed.[1]

Twentynine hydrants were obtained from R. D. Wood & Contractors. They were spaced 500 ft. apart and were all the four inch barrel type except the one at the intersection of Lake St. and Main where the shoe factories were; here they had a six inch barrel. Each hydrant was capable of working under 300 p.s.i. but they never had to operate under more than 62 p.s.i.[2] The town to complete its fire fighting unit appropriated a thousand more dollars for a hook&ladderhouse and six hundred and sixty-seven dollars for a hose carrying carriage along with two 500 ft. hoses, on made of leather the other made of cotton.[3]

On November 2, 1878 the pipes were filled and Cochituate had water. The committee, commisioners, engineers, contractors and laborers had done a good job; the proof of this was in the work. Mr. Blaisdell, head engineer, stressed this opinion in his report addressing the town. He wrote,

> The constant endeavor has been to obtain thorough and permanent construction throughout the entire works rendering justice to all parties and in this effort it is with much satisfaction that acknowledgment is made to your committee for the kindness and assistance which you have rendered me during the construction of the works.[4]

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[1] Town of Wayland, Report of the Construction Committee of Wayland Water Works, p 25.

[2] Ibid., pp. 26- 27.

[3] Town of Wayland, Official Reports of the Town of Wayland For Its 99th Municipal Year From February 1, 1878 to 1879, p. 32.

[4] Town of Wayland, Report of Construction Committee, p 28.

Now Cochituate had a water system and fire fighting unit, but it wasn't long before the growth in population would cause problems; also the North part of town would soon need a water works. The town was going to have to recognize this if it was to keep up with the demands. By April 5, 1879 the Wayland Water Works had 48 services: 41 dwellings, 4 stables , 3 shoe factories, an engine house, and a schoolhouse. By February 1, 1880 it had 87 services: 78 dwellings, 4 shoe factories, a school, an engine house, two stores, a barbershop, a market, and a boardinghouse. So you can easily see that the demand for water in Cochituate was greatly increasing.

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[1] Town of Wayland, Official Reports of the Town of Wayland For Its 100th Municipal Year From February 1, 1879 To February 1, 1880, pp. 31-33.

Diagram Of Cochituate Water Works 1878

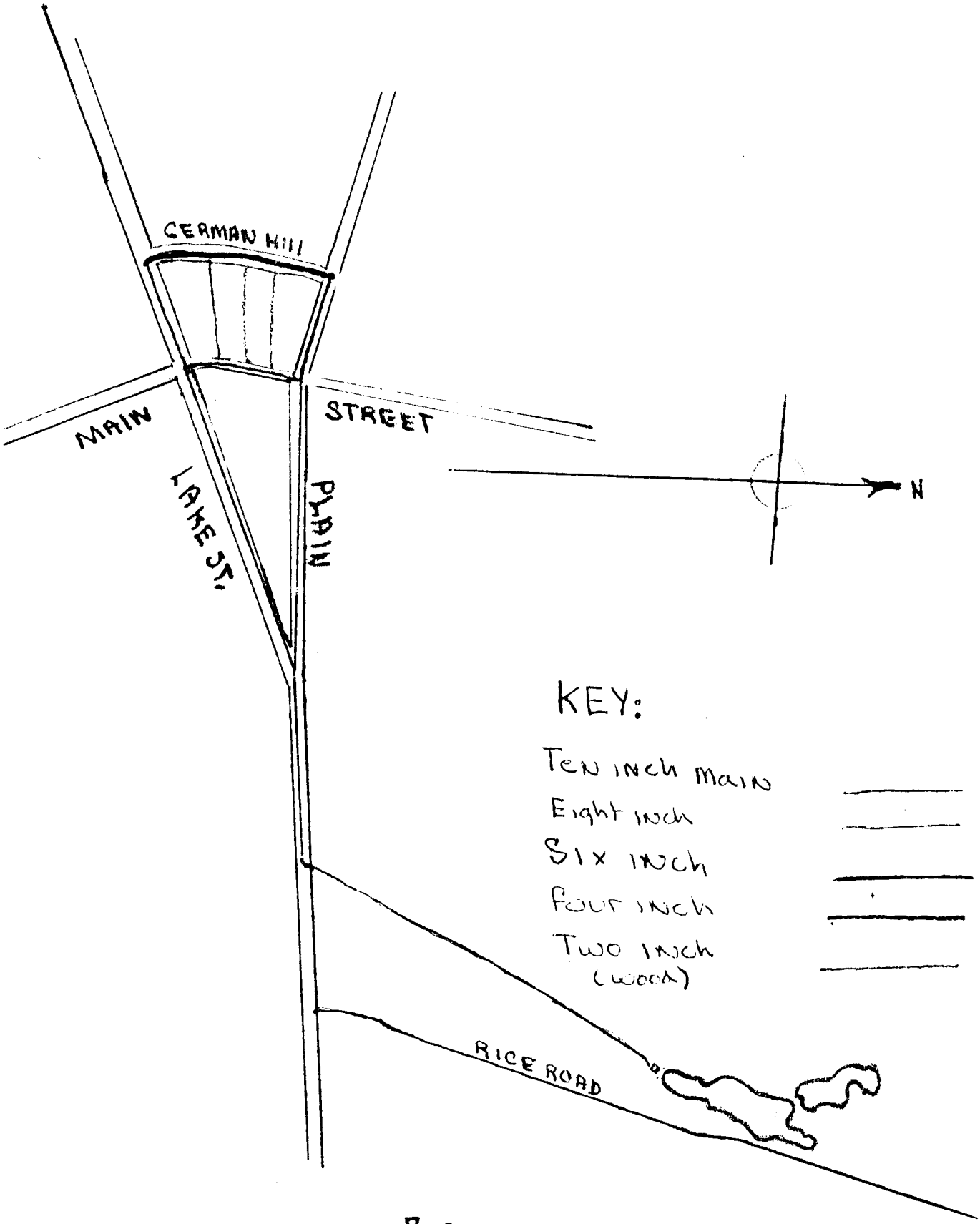
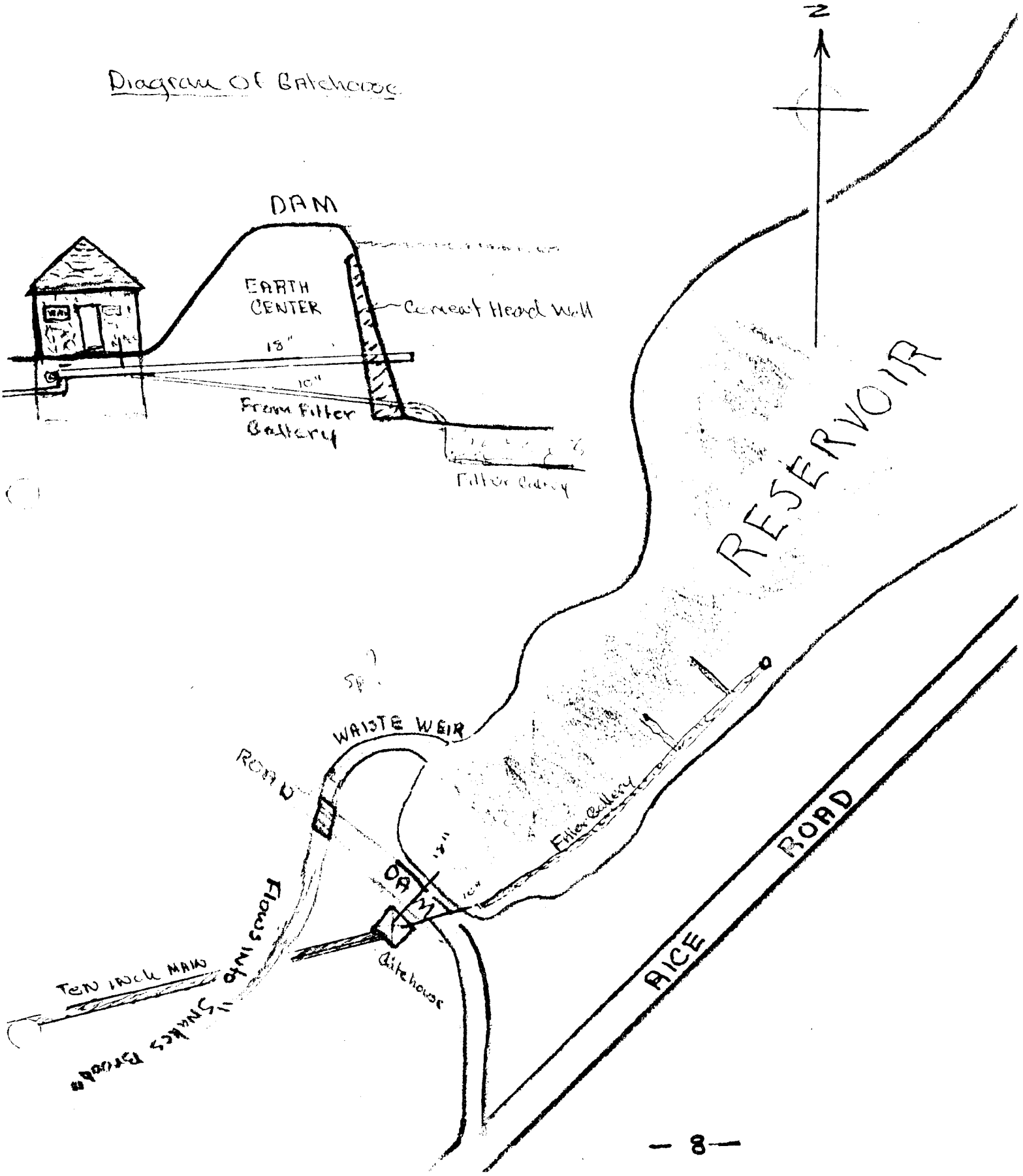


DIAGRAM OF RESERVOIR AND GATE HOUSE
1878



PHOTOGRAPHS OF WAYLAND WATER WORKS

by

Frank Orchard

This is the gatehouse that was constructed in 1878. An eighteen inch pipe and a ten inch pipe use to enter the house from the right and a ten inch cast iron pipe went out the left towards Cochituate. Notice the plaque with W.W.W.

DIFFICULTIES DEVELOP

By the turn of the century, two basic problems had developed. One was concerning the quality of the water from the Reservoir and the other problem was concerning the question of making extensions through and around Cochituate and one into Wayland center.

The people of Wayland had been complaining for four years about the taste, color and odor of the water when the committee composed of five men: Francis Shaw, Walter B. Henderson, Chester B. Williams, Willard A. Bullard and John Connelly decided to take up the matter. They made a request to the Board of Health in Boston to take a look at the situation. The Board of Health complied and after examining the Reservoir water they replied:[1]

> The results of analysis show that the water of the Reservoir is generally colored and contains frequently an excessive quanity of organic matter and that is often objectionable for drinking and other domestic purpose on account of disagreeable taste and odor.[2]

The reason for this organic impurity and vegetation was because over half of the Reservoir was less than three ft., therefore plant life was no wonder. The water was especially unplesant in the winter time because the plants would decay.[3] Previously it was said that the filter gallery filtered out

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[1] Town of Wayland, Report Wayland Water Committee, pp.6-9.

[2] Ibid,, p.7.

[3] Town of Wayland, Report of the Construction Committee of Wayland Water Works, p. 20.

vegetation and other organic impurities, but in the past ten years it gradually lost its effectiveness and the water that past through it had a very hard iron taste including the vegetation.[1] So the committee finally decided, since not very much money was available for them, that they would save money for a few years and then put a filter bed of gravel in the Reservoir instead of dredging the mud out, a solution previously suggested. In 1907 they put in a filter bed of gravel in on the East bank of the Reservoir. This proved to be the solution of the problem of the quality of the water.[2] Never again did it cause trouble but the problem of quantity of water did.

This was the other problem during this time. The center of Wayland had not yet been supplied with water from a public system. This was because in the Northern section of Wayland the underground strata (layers) was loosely packed and very permeable so that water could flow quickly through it. Therefore the people didn't have much trouble obtaining it from either springs or wells.[3] But now there was a growing demand for it and this would soon have to be met. The problem was that the Reservoir could not provide enough water nor pressure to make an extension to the Center or even for futher extensions in the Cochituate area. Infact when the committee asked some engineers to look at the situation the engineers reported that an extension would certainly be impossible unless water from another source was pumped into the system. The reason for

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[1]Town of Wayland, Report Wayland Water Committee, pp. 7-9.
[2]First interview with Prentice Richardson, March 10, 1966.
[3]Second interview with Prentice Richardson, March 28, 1966.

this was because at this time the Reservoir could barely supply Cochituate adequately. In the years of 1880, 1883, and 1889 the Reservoir was nearly emptied.[1] For Cochituate was with ~~forty~~ two hundred - forty seven services and ~~forty~~ hydrants consuming atleast 120,000 gal. from a limited supply.[2] The engineers finally concluded that the best thing to do would be to pump water from another source into the system and use the Reservoir as sort of a storage standpipe. The best source would have been Lake Cochituate, the same source that Boston got its water from. But the committee decided that it would be better to waite until a more suitable time before spending a large amount of money.[3]

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[1] Town of Wayland, Report Wayland Water Committee, (engineers report).
[2] First interview with Prentice Richardson,
[3] Town of Wayland, Report Wayland Water Committee.

THE ESTABLISHMENT OF THE WATER WORKS IN THE CENTER OF WAYLAND

The year was 1926 and a water works was being constructed. Wayland had needed a system for over twenty years and now it was nearly finished. There were two reasons for delaying the building of a system; one was that Wayland didn't have the money to finance it, the other was that water was not that hard to get in this part of town because of the permeableness of the underground strata previously explained. But now wells and springs were not suitable or efficient enough to satisfy the people's demands. Most of the neigboring towns had water systems of some kind and they all proved to be very efficient and time saving for the people.[1]

In the year 1921 Jonathan M. Parmenter died and in his will he left $225,000 for the purpose of constructing a water works. This unexpected donation was just what Wayland needed to get started on their system.[2]

After some planning and collecting appropriate funds the construction began. Baldwins Pond on Old Subury Road was chosen to be the sight for the well field. Here thirty-two wells were driven to the depth of sixty feet. All of the were connected to a twelve inch suction pipe that led into the pumping station. The water was sucked into the station and pumped out by two diesel piston pumps capable of pumping over 300 gal. per min. each.

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[1] First interview with Mr. Richardson.

[2] Interview with Mrs. Blair, curator of the Wayland Historical Society, March 19, 1966.

[3] Deduced from Blue Prints of Wayland Water System, found in Wayland Public Library.

From the station a ten inch pipe runs out to Old Subury Rd. From there it heads down to the center were it branches off in ten inch pipes down each major road. Eight inch pipes were used on the less major through roads and six inch pipes on the small roads. All of the pipes were layed in trenches dug by Bay City machinery brought in on flatcars from Boston.[1] The iron pipes were five feet below the surface to protect them from frost. When all the pipes were layed out this is how the footage distribution was:[2]

Size	Number of feet used
6"	21,654
8"	28,190
10"	11,952
12"	2,829

The water system had to include a standpipe if the system was to have sufficient pressure so Reeves Hill was chosen for the sight of the standpipe. It was built on land purchased from Jacob Reeves. The structure was made with steel frame and paneling. It is about eighty feet in diameter and 15 ft. high. Its capacity is about 500,000 gal. The elevation of the standpipe above sea level is 357 feet. The elevation at Baldwins pond is 124 feet. The difference is 233 ft. there-for the static pressure was 102± a few pounds.(static pressure is obtained by dividing the the differences in elevation by 2.31). A twelve inch pipe ran down from the standpipe across Walter Reeves land to Old Conn. Path were it joined the system.[3]

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[1] Deduced from photo album of construction of works found in the Wayland Public Library.

[2] Blue Prints of Wayland Water System, March of 1927, found in Wayland Public Library.

[3] First interview with Mr. Richardson.

Finally, after a long wait, the people of Wayland had a fine water system. It cost them just a little more than half a million dollars but it was well worth it.[1] There would be no more wrestling with windmills, hand pumps or buckets. Wayland was now a much more modern town.

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[1] First interview with Mr. Richardson.

BALDWINS POND

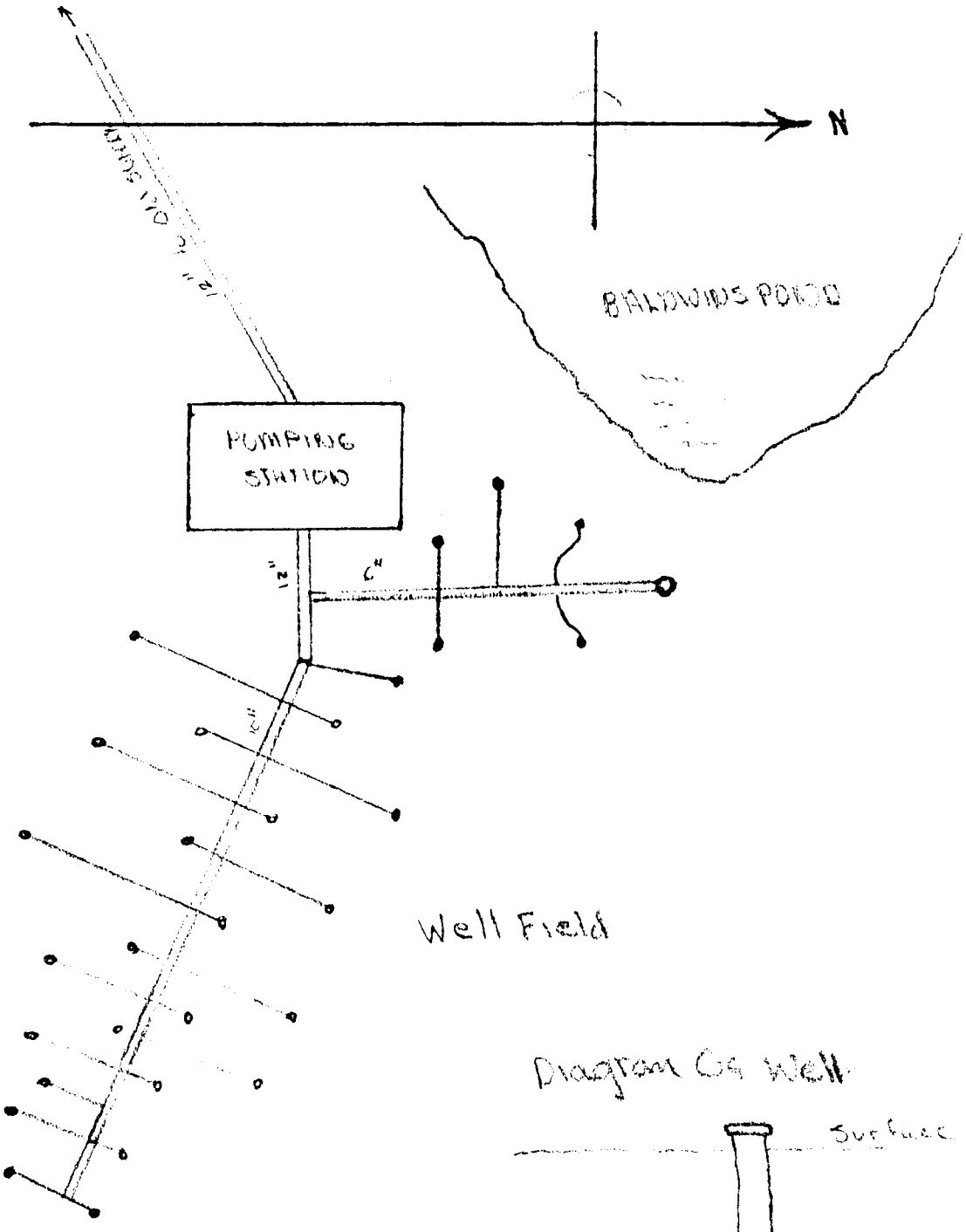


Diagram of Well

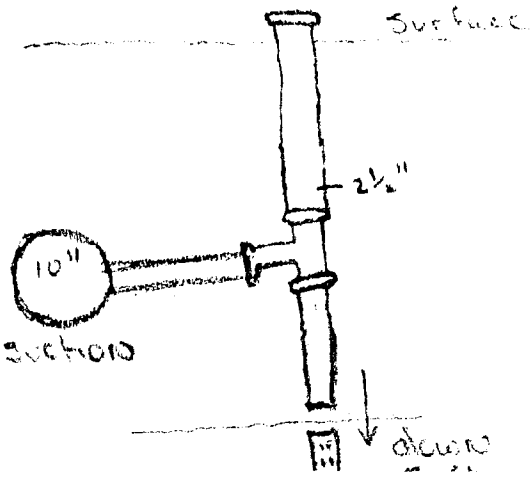
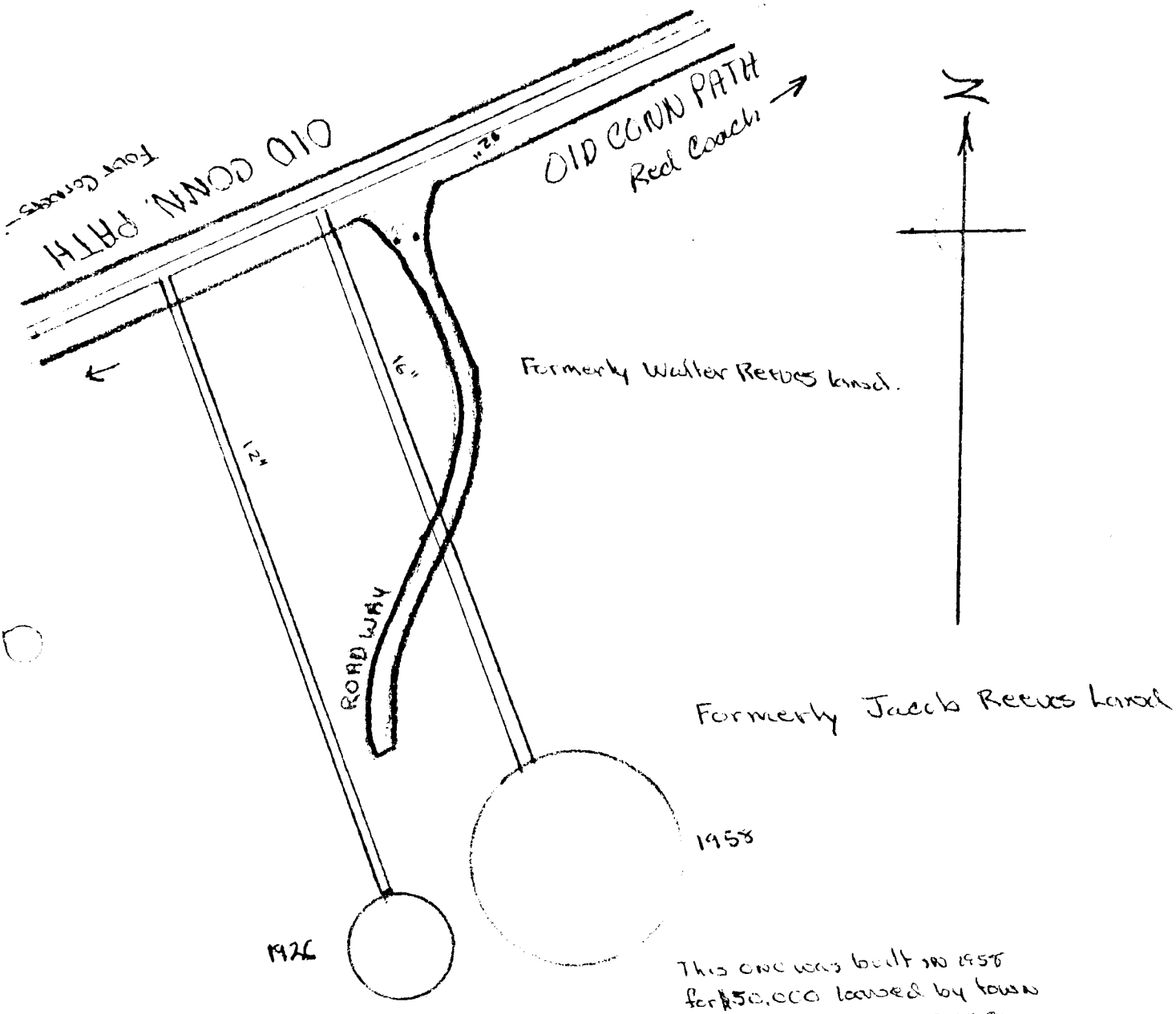
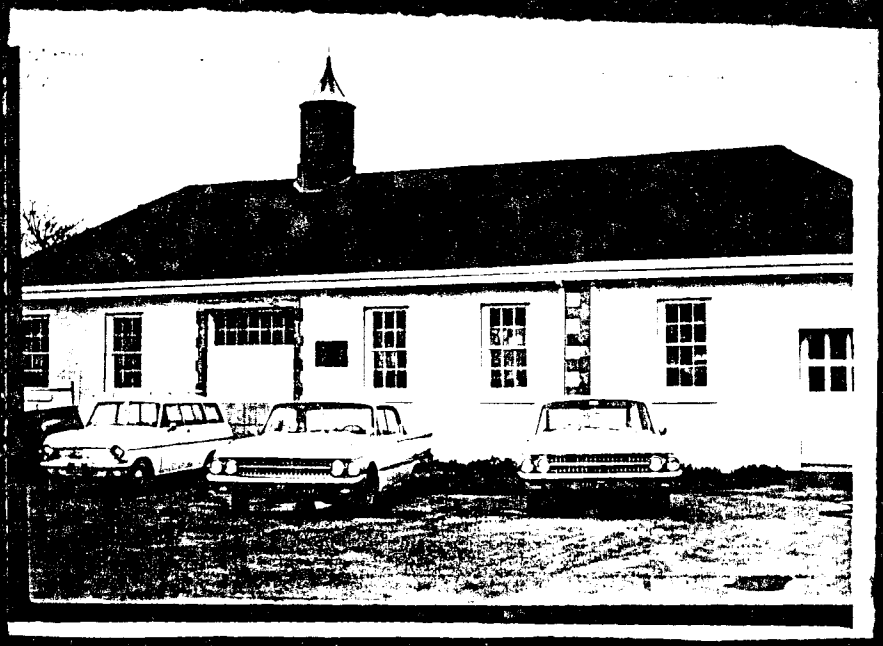


DIAGRAM OF STAND PIPES ON REEVES HILL



This one was constructed out of steel in 1926, has a capacity of 500,000 gal. Its elevation is 357 ft.

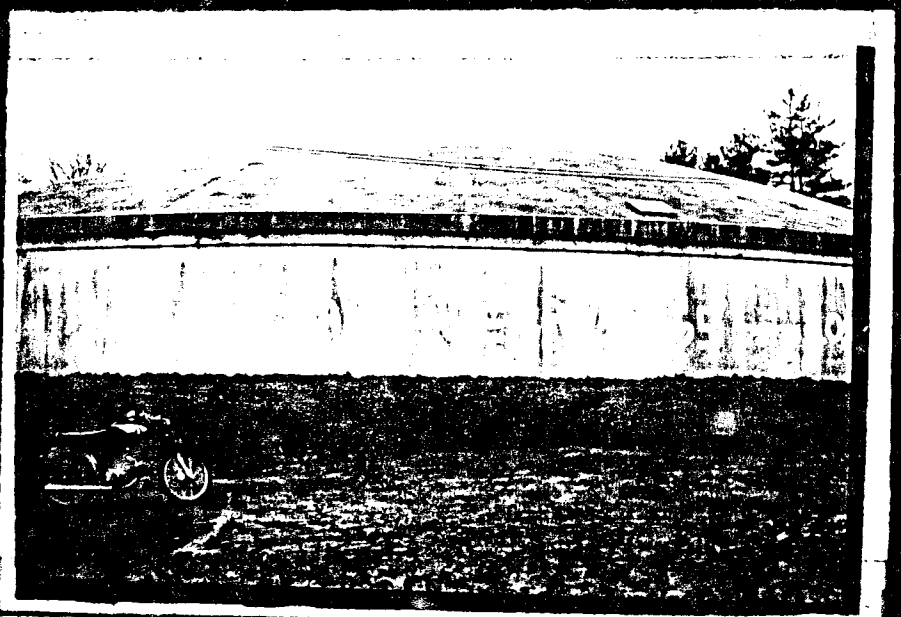
This one was built in 1958 for $50,000 loaned by town Its elevation is 359 ft.



This is the station at Baldwins Pond that was build in 1926. This is were the disel pumps were but now the disels are preserved on display and electric pumps have taken there place.

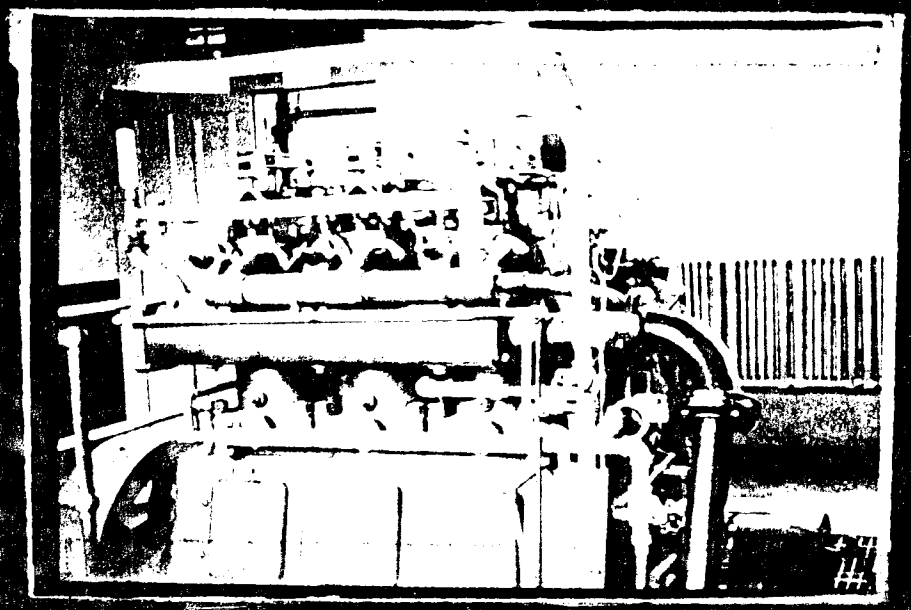
Baldwins Pond

This was the first of the two standpipes build on Reeves Hill in 1927. It has a capacity of 500,000 gal. Its elevation is 357 ft. above sea level and is made out of steel frame and panel.



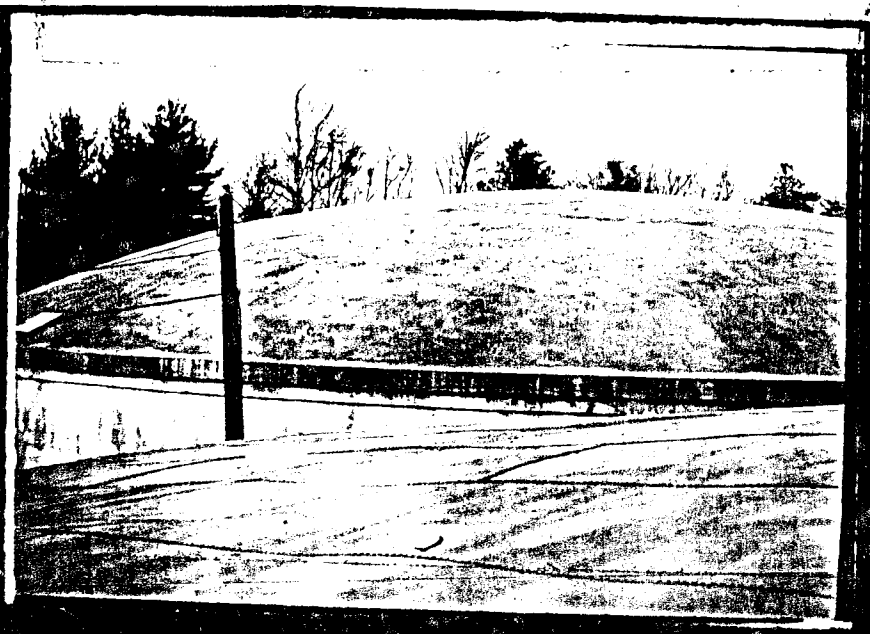
Thats how our other standpipe looks. This one was build in 1958 with money loaned by the town. It is made with concrete and has a capacity of 2,000,000 gal. The tank is about 180 ft. in diameter and the water level is about twelve feet inside.

This is the well field that was driven at Baldwins Pond in 1927. If you look slightly to the left of the field you may see one of our more abundant wells. This well was drilled in 1946.



The disel pumps at Baldwins Pond.

Another picture of the standpipes from the woods of Reeves Hill. At the time of the construction of the pipes this area was fields.



This is the large standpipe taken from the top of the small standpipe.

THE DEVELOPMENT OF THE WAYLAND WATER SYSTEM TO THIS DATE

The Wayland Water Works of today isn't really that much different from the Water Works of 1927. The reason for this is because we have used the system of 1927 to grow on like a skeleton. All we have really done in the past thirtynine years was make additions to the former system. Wayland has been able to do this because the 1927 water works was such and excellent system.

The first addition was in 1932 when an 18" well was dug at Baldwins Pond. With this 300 gal. per min. well feeding into the system the Wayland Water System was connected to the Cochituate water system and the old Reservoir on Rice Road that had served the people of Cochituate for forty years was abandoned.

In 1933 the Wayland Water Works was put on a self-sustaining basis. They would have to operate on the rates they charged the people. The water works was not allowed to make a profit. It would have to put any excess income in a reserve fund for later use. The water rates at this time ran around 25 cents for 750 gallons. They have remained constant and are still the same today.

From the years 1933-1946 there was little change in the system. The growth of Wayland's demands and needs nad slowed down, but right after World War II, a series of additions were made.

In 1946 a [illegible] inch well, [illegible] feet in depth, was dug at Baldwins Pond. It was a [illegible] gallon per minute well and it boosted the capacity to twice what it had been previously.

In 1948 Happy Hollow One was drilled. This well had a capacity

of 440 gallons per minute, greater than any previous well.

In 1950 the two old, diesel piston pumps were replaced by two new General Electric suction pumps that had twice the power of the old diesels.

In 1953 Happy Hollow Two was drilled to a depth of 75 feet. This well has a turbine pump in it. A turbine pump is a pump that is sunk down into the well, motor and all, and with a propellar like a turbine, it forces the water up the well and through the pipes. The capacity of this well is 700 gallons per minute.

In 1955 another well was drilled at Baldwins Pond. This was also a 700 gallons per minute well, and it was run by the electric suction pump. This was our last and most powerful well up to date.

Finally in 1958, Wayland built a second standpipe on Reeves Hill. This second standpipe is made of concrete and has a concrete dome. It is 180 feet in diameter and has water levels ranging from 12 to 15 feet high in it. Its shape is similiar to the Field House at the high school. Its capacity is 2,000,000 gallons. The purpose of the standpipe is to fluctuate and control the system's pressure. For example, when the pressure is high in the pipes, the water level rises until the maximum. When it reaches the maximum height a signal will be sent by telemeter back to the stations and shut off the pumps automatically. This procedure is practiced every night.

Right now in Wayland we are faced with a drought. During a drought the water table receeds deeper. The Wayland tables now read about six feet below normal. In the summer the peo-

ple use the most water when it can put out the least. This is why water bans are put out during the summer.

Wayland is lucky to have the good water it does. The water has never had to be treated. Our wells are very pure and free of contamination. The state requires an analysis three times per year and a bacterialogical test. The state has always okayed our water.

The Wayland Water Works operates on about 130,000 dollars per year. The rates are 25 cents for every 750 gallons. The payments are quarterly and average about $60 a year for each dwelling.[1]

The sums apropriated by the town for the Water Department are as follows;[2]

Maintainance Salaries:

Superintendent	$ 9,233.20
Working Forman	6,537.40
Maintainance men (2)	11,529.70
Labor	25,000.00
Town Office (2)	8,772.75
	$61,073.05
	$61,073.05
Appropriations	46,000.00
Extensions	30,500
Total	$150,213.05

[1] Combination of interviews with Mr. Richardson

[2] Town of Wayland, Report of the Finance Committee 1966, Article 8.

CONCLUSION

Right now Wayland Water Works is pumping 432 million gal. per year. It has 3,392 services in use, eighty one miles of main, 466 hydrants, and ninety-eight new services.[1] So far the system has been able to keep up with the demands of the people by sinking five wells in the past twenty years, but will it be able to satisfy the demands of the people in twenty years? The problem of conservation is a real one that must be faced. The establishing, building and developing of the Wayland Water Works proves that it takes alot of time money and thought to be sucessful like The Wayland Water Works has been throughout the years.

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[1] Town of Wayland, Annual Report Town of Wayland for its One-Hundred Eighty Six Municipal Year. p. 215.

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6. Town of Wayland, Report, Wayland Water Committee, (Appointed of town meeting) March 24, 1903.

7. Town of Wayland, Report of the Finance Committee, 1966.

8. Town of Wayland, Annual Reports for its One Hundred Eighty-six Municipal Year, 1965.

9. An Interview with the Wayland Water Superintendent, Prentice Richardson March 10, 1966.

10. A second interview with Prentice Richardson, March 28, 1966.

11. Anonymous, Blueprints of Wayland Water System, March of 1927.