

REPORT
OF
Committee on Water Supply
FOR
ACTON, MASS.

With Report of Engineer F. L. FULLER.

1895.

ACTON, MASS.:
THE ENTERPRISE PRINTING COMPANY.

REPORT OF COMMITTEE.

The Committee appointed at the annual town meeting held in April, 1895, herewith submit their report as per instructions given in the adoption of the following vote :

Voted, That H. A. Littlefield and D. J. Wetherbee be added to present committee — (Wm. D. Tuttle, D. H. Hall and Francis Conant,) and this Committee is instructed to employ a competent engineer to examine the sources of water supply, make plans and estimate of cost, also to ascertain the number of persons in town who will take water, and submit their report to the town in print as soon as ready.

Pursuant to these instructions your Committee met on May 10th and organized as follows : Wm. D. Tuttle, Chairman, H. A. Littlefield, Secretary, D. H. Hall, Treasurer, and voted to proceed at once in the discharge of their duties, the first and most important of which was the location of a reservoir and where to obtain a supply of water. For this purpose we employed Mr. Frank L. Fuller, of Boston, an engineer of repute, and acting on his recommendation decided on Great Hill as the best place for a reservoir or stand pipe, on account of its height and its being so near the centre of the district to be supplied. This hill is 361 feet above the sea level, which gives adequate pressure in any part of the district. The pressure in Acton Centre would be 86 pounds, in East Acton 138 pounds, in South Acton 111 pounds and in West Acton 100 pounds. See table of elevations and pressures.

Having decided on the disposal of the water our next move was to obtain it, and for this purpose visited, with the engineer, several points, among them Nagog Pond and the valley below, and the Fort Pond valley in the west part of the town. Mr. Fuller reported that the most favorable indications were in the Fort Pond valley between South and West Acton, and we decided to make tests there.

A proposal from Mr. Fuller to make a complete survey, plans, estimate of cost and a report on a water system for the town of Acton, including superintending the driving of the wells, for the sum of four hundred dollars, was accepted, and Mr. Daniel Russell was employed to do the work, which was commenced on June 12. Forty-two wells were driven in all, a statement respecting which will be found in the engineer's report following.

The expense of making these tests has been \$799.03, which is about double what the Committee expected to expend; but the first tests proving unsatisfactory, we proceeded up the valley, driving wells at intervals, until an expense of some four hundred dollars had been made, and as the prospect was improving, we concluded that it would be more satisfactory to everyone to carry the work on till certain lands had been tested, than to stop with nothing accomplished. We therefore made tests further up the valley till we reached the land of Isaac Reed, where we found an abundant supply of good water, from clean, coarse gravel, at a depth of from twenty to forty feet. This location is about one-fourth of a mile west of Wright's hill in West Acton. It is an ideal location, being part of a reclaimed meadow, free from anything likely to contaminate the water. The quality of the water is excellent, as shown by the analysis hereto attached. This tract of land covers about ten acres, and can be bought at a reasonable price. Although the whole ten acres are not actually needed for driving the wells, it would be better for the town to control it, and thereby keep buildings or other things away that might tend to pollute the water.

We have made a canvass of the district covered by the pipes and have assurance of an income to start with of \$2000, and judging from what we have been told by property owners, we have no doubt that the rentals from faucets would start at \$2500, and in less than five years the rentals would amount to \$3000, and would steadily increase.

The cost of running the water department might be estimated as follows :

Engineer,	\$ 650 00
Collector,	100 00
Fuel,	500 00
Incidental expense,	50 00
Contingent expense,	50 00
Interests on Bonds, \$100,000 at 3 1-2 per cent.,	3,500 00
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	\$4,850 00
Revenue from faucet rentals,	2,500 00
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Deficiency,	\$2,350 00

All towns credit the water department for hydrant rentals and for public buildings, etc. Or if a town is supplied by a private company they are paid by the town, rentals ranging from fifteen dollars to fifty dollars per hydrant. Our estimate includes one hundred hydrants and rentals from them should be credited as revenue for the water department.

Should we estimate —

100 hydrants at \$25 each,	\$2,500 00
Public buildings, etc.,	185 00
Faucet rentals,	2,500 00
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Total income,	\$5,185 00
Total expense,	4,850 00
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	\$ 335 00

The Water Act provides for towns to issue bonds or to pay a certain amount annually to adjust the financial part of the plan. If payments are made annually we would suggest making the annual proportionate payments small amounts for a few years, say ten, after which time the income from the works would warrant larger proportionate payments for the remaining time.

In conclusion, we find the inhabitants of the village generally in favor of a town water supply. It is impossible to run a pipe

by every man's house in town so as to give them direct benefit, but anything that helps the villages must correspondingly help the town. We have covered very nearly all the villages, and but little extension would be needed for some time.

There are three places not included in the estimate by inadvertance:—Maynard street in South Acton, a distance of about 1800, feet and in West Acton from house of H. E. Gates on Summer street, to house of I. S. Getchell, 1100 feet, and 300 feet on Highland street, of 6 inch pipe, which we recommend including, and which would not make the sum total \$100,000.

For details of plan, location of pipes and estimate, we refer you to the engineer's report.

Respectfully submitted,

WILLIAM D. TUTTLE,
DELETTE H. HALL,
FRANCIS CONANT,
HANSON A. LITTLEFIELD,
DANIEL J. WETHERBEE,

Committee on Water Supply.

Acton, Mass., Nov. 22, 1895.

EXPLANATORY:—The streets of West Acton have recently been named and may not be familiar to the town. To aid in locating the streets so named:—Massachusetts avenue is the turnpike, Arlington street is the Leland Stevens road, Willow street is the Stow road, Central street from Littleton to South Acton, Summer street is the Boxboro road.

ENGINEER'S REPORT.

To the Committee on Water Supply, Acton, Mass.

GENTLEMEN :—At your request I have investigated the question of a Water Supply for the Town of Acton, and would respectfully present the following report:

On May 25th the various parts of the town were visited with your committee and all the possible sources of supply examined. Two sources seemed possible, but only one appeared of reasonable cost, viz: a ground water supply from the valley of Fort Pond Brook. The other supply which has been suggested is Nagog Pond, which lies partly in Acton and partly in Littleton.

The water shed of this pond, as measured on the State topographical map is about 1.75 square miles. It is about four miles from the pond to Great Hill, the most suitable elevation for a stand pipe. The surface of the water in the pond is of about the same elevation as the ground at South Acton. Water taken from this source would therefore require to be pumped. The force main from Nagog Pond to the stand pipe would pass through very ledgy streets and the cost for rock excavation would be very great. The pumping station would naturally be located at the south westerly end of the pond. This would require a long haul for coal and would be a long distance from either village of the town.

For these reasons attention was directed to a ground water source for supplying the town. The valley of Fort Pond Brook, just below the junction of the Heathen Meadow Brook, appeared favorable and five 2 1-2 inch test wells were driven in this locality by Daniel Russell of Boston.

One of these wells was driven to a depth of 56 feet. The results obtained were not satisfactory, the material being too fine to contain much water.

Wells were also driven near West Acton on land of W. H. Teele, west of Arlington street. Tests were also made on the east side of the same street. These wells were all within a short distance of Fort Pond Brook. A few of the wells yielded considerable water, but all were shallow on account of a ledge a short distance below the surface.

Three wells were driven on land of Andrew Hapgood, but were not satisfactory. Two wells were driven on H. A. Gould's land but no water obtained. Test wells were also driven on land of J. Barker, I. C. Knowlton and E. C. Parker, without satisfactory results. Twelve test wells driven on land of Isaac Reed, north of Massachusetts avenue gave much better results. Three of these wells struck ledge or boulders at from 17 to 18 feet below the surface. In other cases what appeared to be ledge was reached at a distance of from 25 to 48 feet. Four wells encountered no ledge. Nearly all the wells yielded 50 gallons per minute with a diaphragm pump.

Two wells were driven in the same vicinity, but in the town of Boxboro. One was on land of E. Parker and one on land of I. S. Getchel.

In all forty-two test wells were driven. Samples of the material through which the pipes were driven were taken every five feet and oftener where necessary, and preserved for reference.

Samples of water from three of the wells were taken and sent to the State Board of Health for analysis. Their return indicates that when the water has been pumped clear, it will be of excellent quality. In appearance this ground or spring water will be much superior to any surface or pond water. The same will be true of the taste. It is virtually spring water and being

pumped to a covered stand pipe, its quality will be preserved and it will prove entirely satisfactory for drinking and all other purposes.

The land upon which these wells were driven is a nearly level area, extending northerly from Massachusetts avenue to Fort Pond and Guggins Brooks.

The water shed above the junction of these two brooks is about 9.9 square miles, as given on the State topographical map. The level area referred to is of considerable extent and is evidently composed of fairly coarse sand and gravel. As before stated, the yield of water is good. There is no doubt that an ample supply of excellent water can be obtained at this point.

The water would be taken from a large collecting well properly located, or from a system of driven wells. A suitable pumping plant would be located near the well or wells and the water forced through a ten inch pipe, by way of Massachusetts avenue, Central and Acton streets to a stand pipe 25 feet in diameter by 100 feet high, located on Great Hill. This stand pipe would have a capacity of 367,000 gallons.

The head and pressure exerted at various parts of the town is shown in the table of elevations included in this report.

From the stand pipe the water is distributed through the town as shown on the map of the town accompanying this report. The population of the town is somewhat scattered, but the pipe system will extend to a large proportion of the houses and other buildings. The matter of fire protection has been carefully provided for. Such a system as the one proposed will be a great benefit to the town.

By the census of 1895 the town of Acton had a population of 1,979, an increase of a little over 4 per cent. over the population in 1890. The town is well provided with railroad accomoda-

tions and is naturally attractive. It seems to need more general business, and additional manufacturing industries would be a great advantage. To secure these, a town must be progressive and offer inducements equal to those of other towns. Chief among other inducements, is a good water supply. Most towns are obtaining them, not so much as a luxury as a necessity.

The estimated cost of the system is shown in detail upon the estimate sheet accompanying this report.

Respectfully submitted,

F. L. FULLER,

Civil Engineer.

Acton Water Works.

TABLE OF ELEVATIONS.

	Elevation above Sea Level.	Head, in feet.	Head, in lbs.
High water in Stand Pipe, Great Hill,	461	0	0
Top of Great Hill,	361	100	43
Isaac Reed's meadow, Pumping Station,	210	251	109
Top of Wright's Hill (W. Acton),	314	147	64
Intersection of Mass. ave and Central street,	230	231	100
Hapgood's crossing, Central street. (W. A.),	215	246	106
R. R. crossing, Central st., (between W.A.&S.A.)	210	251	109
R. R. tracks at S. Acton,	204	257	111
Summer st., at H. Gates, (W. Acton),	232	229	99
Intersection of Stow and Martin sts., (S. A.)	202	259	112
Maynard st., at Jos. Evans,	240	221	96
Intersection of School and South sts., (S. A.)	191	270	117
" " Mass. ave and South street,	168	293	127
" " Cross st. " " "	228	233	101
" " Gravel Pit road and Acton st.	263	198	86
" " Poor Farm road and Lowell rd.	242	219	95
Poor Farm road at Poor Farm barn,	340	121	52
Concord street at Sudbury road,	183	278	120
" " " Main street (E. Acton),	143	318	138
Main st., opposite Henry Worden's, (E. A.)	144	317	137
" " " Hayes, (E. A.)	136	325	141
Mass. ave. at School street, (E. A.)	156	305	132
School street at street to Reformatory,	134	327	142
River street at Merriam street (S. A.)	165	296	128

ACTON WATER WORKS.

IN	STREET.	FROM	TO	12 in.	10 in.	8 in.	6 in.	Wt. per ft.	Total Wt., lbs.
S. Acton	Acton	Maynard street	Station 3100	3100	1318			79	223,200
"	Acton	South	Tuttle street					58	70,444
W. "	Arlington	"	"			900		49	37,800
"	Arlington	Central	C. N. Holbrook's				1375	29	30,875
"	Arlington	Central	E. H. Whitcomb's				1140	29	33,060
"	Central	Mass. avenue	Geo. B. Parker's			685		42	58,770
"	Central	Mass. avenue	Acton street		9052			58	625,016
Acton to E. A.	Read's court	Stow street	Isaiah Reed's			2206		42	99,682
Acton	Concord	Acton	Main st. E. Acton			6842	800	29	23,200
So. "	Gravel Pit road	Acton	Wm. Kingsley's				1586	42	287,364
Acton	Line to Stand Pipe	Sta. 3100, Acton st.	Stand Pipe	550				72	45,904
E. Acton	Lowell Road	Stow Farm road,	Schoolhouse			300		42	30,600
Acton	Main	D. P. Parfitt's	Hayes' house			2813		29	12,600
So. "	Maple avenue	Gravel Pit road	J. B. Tuttle's				1005	29	118,146
So. "	Maple street	Martin street	Maynard street					42	29,145
W. "	Martin	Central	Maple street			2225		42	33,000
So. "	Mass. avenue	Boxboro line	Schoolhouse			800		58	286,752
So. "	Prospect	Central street	Parsonage		4944			29	27,753
W. "	Railroad	Stow	Westerly				957	29	8,598
W. "	School	Arlington	Gate's house				302	29	17,284
So. "to Act'n	School	Acton	South street		2323		596	58	134,794
So. "	South	School	Acton street		8941			58	518,578
W. "	Stow	Acton	Tuttle's farm				2747	29	70,683
Acton	Summer	Willow	H. Gates				460	29	13,840
W. "	Tuttle	Acton	Station 460				1282	29	35,728
W. "	Willow	Central	Summer street					29	78,010
W. "	Windsor	Mass. avenue	Central street				1500	29	43,500
W. "	Hydrant Branches, blow-offs,			3,650	26,578	16,771	18,623		3,018,773

ESTIMATE OF COST.

Pipe, 3048,773 lbs. cast iron pipe at \$0.011 per lb.,	\$33,536 50
Pipe laying, 3,650 ft. 12 in. at \$0.33,	\$1,204 50
26,578 " 10 in. " 0.28,	7,441 84
16,771 " 8 in. " 0.24,	4,025 04
18,623 " 6 in. " 0.20,	3,724 60
65,622 " = 12.43 miles.	16,395 98

Stand pipe, 25 ft. diam., 100 ft. high, capacity 367,000 gallons,	\$9,500 00
Foundation for same,	700 00
Roof, (wood) " "	300 00

(Pumping Station and Chimney, brick),

Wells,

Pumping plant,

Special castings,

Gates, 6 12 in. at \$35 00,	\$210 00
32 10 in. " 26 00,	832 00
30 8 in. " 18 00,	540 00
28 6 in. " 12 00,	336 00

96 Gate boxes at \$ 3 50,

100 Hydrants " 26 00,

Rock Excavation,—Estimated,

1,918 00	1,918 00
336 00	336 00
2,000 00	2,000 00
7,500 00	7,500 00
\$88,486 48	\$88,486 48
8,848 65	8,848 65
	\$97,335 13

Add 10 per cent. for Engineering and Contingencies,

Boston, Oct. 12, 1895.

F. L. FULLER, *Civil Engineer.*

COMMONWEALTH OF MASSACHUSETTS.—STATE BOARD OF HEALTH.

WATER ANALYSIS.—ACTION.—PARTS IN 100,000.

No.	DATE OF		APPEARANCE.			ODOR.		RESIDUE ON EVAPORATION.		AMMONIA.			NITROGEN AS		REMARKS.					
	Collection.	Examination.	Turbidity.	Sediment.	Color.	Cold.	Hot.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	In Solution.	In Suspension.		Chlorine.	Nitrates.	Nitrites.	Oxygen consumed.	Hardness.
1895.	Aug. 10.	Aug. 13.	Slight.	Heavy.	Filt.	None	None	5.80	—	—	.0004	—	—	—	.22	.0100	.0000	.0624	2.6	Filt. .0030
14797	Aug. 10.	Aug. 13.	Dist'ct.	Heavy.	0.02	None	None	5.50	—	—	.0002	—	—	—	.22	.0040	.0000	.0783	2.6	Filt. .0050

No. 14797. 2 1-2 in. driven well, 24 ft. deep.
 No. 14798. 2 1-2 in. driven well, 29 ft. 4 in. deep.

The color of water is expressed by numbers which increase with the amount of color. Boston water, as drawn from a tap at the Institute of Technology, had an average color in 1894 of 0.69. Other water supplies in the State have an average color of from 0 to 1.45.

All waters containing suspended matter, excepting ground waters which contain a large quantity of iron, are filtered through filter paper before determining the color and residue on evaporation. Occasionally those determinations are also made on the unfiltered water; the results in such cases being indicated by an asterisk.