9-255
(Jan. 1927)

Test hole no. 1
~~Well no.~~

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

RECORD OF WELL

8834

Carmel 15 quad
15Y, 6.9 & 7.9E
sec 835-840
and 841-883

Locate well on plat of section.

1. **Location:** State N.Y. County Putnam
Nearest P. O. Brewster Direction from P. O. ENE
Distance from P. O. 1 miles; ¼ sec. , T. , R.
If in city, give street and number Town of Southeast

2. **Owner:** Brewster Village Address Brewster, N.Y.
Driller: Carlson Wells, Inc. Address 33 West 42nd St., New York 18, N.Y.

3. **Situation:** Is well on upland, in valley, or on hillside? valley

4. **Elevation of top of well:** 340 ft. above (Above or below) the level of mean sea level (Sea, depot, lake, or stream)

5. **Type of well:** drilled (Dug, driven, bored, or drilled); kind of drilling rig used st. (Solid tool, jetting, rotary, etc.)

6. **Depth of well:** 20 ft.; year in which well was finished ~~1952~~ August 4, 1952
Does well ~~enter~~ touch rock? yes; if so, at what depth? 19 ft.; kind of rock

7. **Diameter:** At top 6 inches; at bottom 6 inches.

8. **Principal water bed:** sand and gravel (Gravel, sand, clay, or rock. If rock, state kind)
Depth to principal water bed ft.; thickness of bed ft.
If other water supplies were found, give depth to each

9. **Casings:** Kind ~~pulled~~ metal; size 6"; length 19 ft.; between depths of 0 and 19 ft.
Kind ; size ; length ft.; between depths of and ft.
Kind ; size ; length ft.; between depths of and ft.
Packers (if any): Depth at which packers were used ; kind
Screen or Strainer: Was well ~~finished~~ tets with screen? yes; kind of screen ;
length of screen ft.; diameter 5 inches; size of openings

10. **Head:** Does well at present overflow without pumping? ; did it overflow when new? yes ;
if flowing, give pressure lb. per sq. inch; or height water will rise in a pipe ft. above surface;
original pressure or head ; if not flowing, give water level in well 7 ft. below surface.

11. **Pump:** Is the well pumped? no ; kind of pump —;
size or capacity of pump —; kind of power —

12. **Yield:** Natural flow at present (if any) gallons per minute; original flow gallons per minute;
well has been pumped at gallons per minute continuously for hours;
quantity of water ordinarily obtained from well gallons per day.

13. **Use:** For what purpose is the water used?

14. **Quality of the water:** "pH expected to be under 7" (Hard or soft, fresh or salty, etc.); is there an analysis? no

15. **Cost of well,** not including pump: Temperature of water ° F.

Name of person filling blank H. Grossman from attached report by driller
Date 4/7/54 Address U.S. Geol. Survey in Albany

On the back of this sheet give the record of the beds through which the well passed and any other facts not given above.

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LOG OF WELL

KIND OF ROCK OR OTHER MATERIAL (Give color and tell whether hard or soft)	DEPTH, IN FEET		THICKNESS, IN FEET	REMARKS (Especially information as to water found)
	From—	To—		
TH No. 1				
0 - 6' Clay, sand and boulders.				
6 - 10' Silty fine sand with coarse sand.				
10 - 14' Silty coarse sand and gravel mixed with fine sand.				
14 - 19' Silty coarse sand and gravel				
19 Bedrock				

U. S. GOVERNMENT PRINTING OFFICE 6—9642

SECOND REPORT ON UNDERGROUND EXPLORATIONS

(WELL-POINT SYSTEM)

GROUND WATER SUPPLY FOR VILLAGE OF BREWSTER, NEW YORK

New York, New York October 21, 1952

STATES ...TERIOR

Carmel 15 Quad

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SECOND REPORT ON UNDERGROUND EXPLORATIONS (WELL-POINT SYSTEM) GROUND WATER SUPPLY FOR VILLAGE OF BREWSTER, NEW YORK

1. General. This work supplements the first set of explorations conducted by Caisson Wells, Inc., last summer. Due to the presence of fine sand mixed with silt, it became necessary to conduct a second set of underground explorations, in order to collect the necessary data for determining whether a sufficient capacity of ground water could be obtained economically by means of a Caisson Well installation.

2. Description of exploratory work. A total of 32 well-points were jetted down to proper water-bearing formation, 10 on Gross's property and the balance on Durkin's property, along the fence denoting its southern boundary. In addition, approximately 10 more points were sunk, but not to proper depth, due to obstruction in the ground (apparently a large stone). These were withdrawn without testing.

Special $1\frac{1}{2}$" well-points with a fine wire mesh screen and a check valve at the bottom were employed, and the work proceeded quite rapidly. These points were connected to a steel pipe and water was withdrawn therefrom by suction.

Depths at the different well-points varied considerably. In the main, the object was to tap the two gravel formations, one at about 7 to 13 feet and the second about 32 to 40 feet below ground, although satisfactory pumpage was obtained in some of the sites at a depth 18 to 22 feet below ground.

A total of 10 different sites were investigated, four on Gross's property and six on Durkin's property.

3. Survey findings. Results of the exploratory work are considered as quite satisfactory. It is the writer's opinion that, Gross's property can be developed to satisfy Brewster's present needs adequately, and that, if additional capacity is required in the future, Durkin's land could be developed to supply enough water to satisfy Brewster's needs for the next 30 to 50 years.

Indications are that the underground water-bearing strata are in direct contact with the river water. This is a very important factor in a water supply system, because it affords the possibility of a dependable source of excellent groundwater, obtained through induced infiltration

from the river. Water in its path underground is thoroughly filtered and, any solids, whether in mechanical or colloidal suspension, including bacteria, color and other objectionable matter in the water, are retained by the highly efficient natural filter action. Water thus obtained retains the good qualities of the surface water, but none of its injurious ones, and it is expected that the water will be relatively soft and substantially cooler than the raw river water.

A considerable number (over 12) of pumping tests were conducted, all of which were satisfactory. The last pumping test at site A on Gross's property yielded a total capacity of 95 gpm, 73 gpm from the upper stratum and the balance from the lower stratum. Site A is same as Site 2 of the first report, submitted on September 22, 1952.

Water obtained from this site is likely to be of excellent quality and two samples were personally collected by Mr. William Alexander toward the end of the test, one from the upper, and the other from the lower formation. Water from this site seems to be free from iron and other objectionable ingredients, as this, it is believed, will be confirmed by t e State analysis.

All water samples obtained from Durkin's property contained some iron in solution which, through reaction with atmospheric oxygen and that contained in the water, settled as brown sediment. (Ferric hydrate). The water, likewise, contained a slight sulphur odor which, however, could readily be eliminated through aeration or simple chlorination.

It is the writer's opinion that, through prolonged pumpage, this iron can be reduced considerably or even completely eliminated. The same applies for the slight sulphur odor, which is mainly due to solution of minute quantities of vegetable matter off the swamp floor in the northern section of the area. This section is overlain with a heavy and dense layer of clayey silt, and, as a result, the underground water body is confined, moving toward the river at an extremely slow rate. It is reasonable, therefore, to expect that if pumpage, of alternating intensity, is induced along the southern boundary of Durkin's property, water from the river would be caused to flow underground through the formation, and all undesirable soluble matter could be washed out from the aquifer.

The reason why Gross's area contains no iron can be explained by the fact that all drainage water from high ground to the west flows underground through his property and into the river. This drainage water, apparently free from iron, has removed all soluble matter from the aquifer, including iron, and since this area is separated from Durkin's land through an impervious underground dam of silty-clay and fine sand, located at about 100 feet east of site A, it would seem reasonable to assume that the two water bodies will be permanently separated from each other, although both seemingly in contact with the river water body. Confirmation of this

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underground dam was made through sinking of six well-points to depths from 12 to 40 feet, none of which yielded any water. The writer's theory is, that at the path of the swamp brook where these points were sunk, percentage of clay and silt was predominantly high, and this situation prevailed at all stages of deposition until today, when the process is repeated.

4. Recommendations. A single 100-inch o.d. Caisson Well at site A to an approximate depth of 35 feet below ground, properly gravel-packed to tap both the upper and lower horizons, could yield a capacity of 300 to 350 gallons per minute. This well will be equipped with an adequate stainless-steel or Everdur screen having $\frac{1}{4}$" slots. A second Caisson Well 54-inch o.d., located along the swamp brook on Gross's property, about 100 feet upstream from site A, and sunk to a depth of about 20 feet, could yield a capacity of 100 to 150 gallons per minute. This unit will likewise be gravel-packed, and will be provided with ample special-metal screen.

Additional capacity could be secured through the installation of one or more 54-inch o.d. Caisson Wells on Durkin's property, the closest one of which would be at a distance of about 350 feet from site A. These Caisson Wells could be expected to produce a capacity of 100 to 150 gallons, each, and they would likewise be extended to a depth of about 20 feet below ground.

The advantage of this arrangement is that the one, two, or more shallow 54-inch units could be siphoned into the main 100-inch o.d. well, and a single pump would only be required to pump the entire system efficiently.

Such a system of water supply has been installed by Caisson Wells, Inc., in Manville, New Jersey, in Milford, New Jersey, and in Windsor Locks, Conn., with excellent results, and is highly recommended for Brewster.

CAISSON WELLS, INC.

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UNDERGROUND EXPLORATIONS FOR VILLAGE OF BREWSTER, NEW YORK - - - - - - - -

Logs of Test Holes

TH No. 1

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0	- 6'	Clay, sand and boulders.
6	- 10'	Silty fine sand with coarse sand.
10	- 14'	Silty coarse sand and gravel mixed with fine sand.
14	- 19'	Silty coarse sand and gravel
19		Bedrock

TH No. 2

P835

0	- 7'	Mud and sand
7	- 12'	Sand and gravel
12	- 28'	Silty fine sand with some gravel
28	- 32'	Silty fine sand mixed with coarse sand and gravel
32	- 37'	Silty fine and coarse sand mixed with gravel
37	- 40'	Silty very fine sand with gravel
40		Bedrock

TH No. 3

P836

0	- 7	Mud and sand
7	- 12'	Sand and gravel
12	- 24½'	Silty fine sand with some gravel
24½		Bedrock

TH No. 4

P837

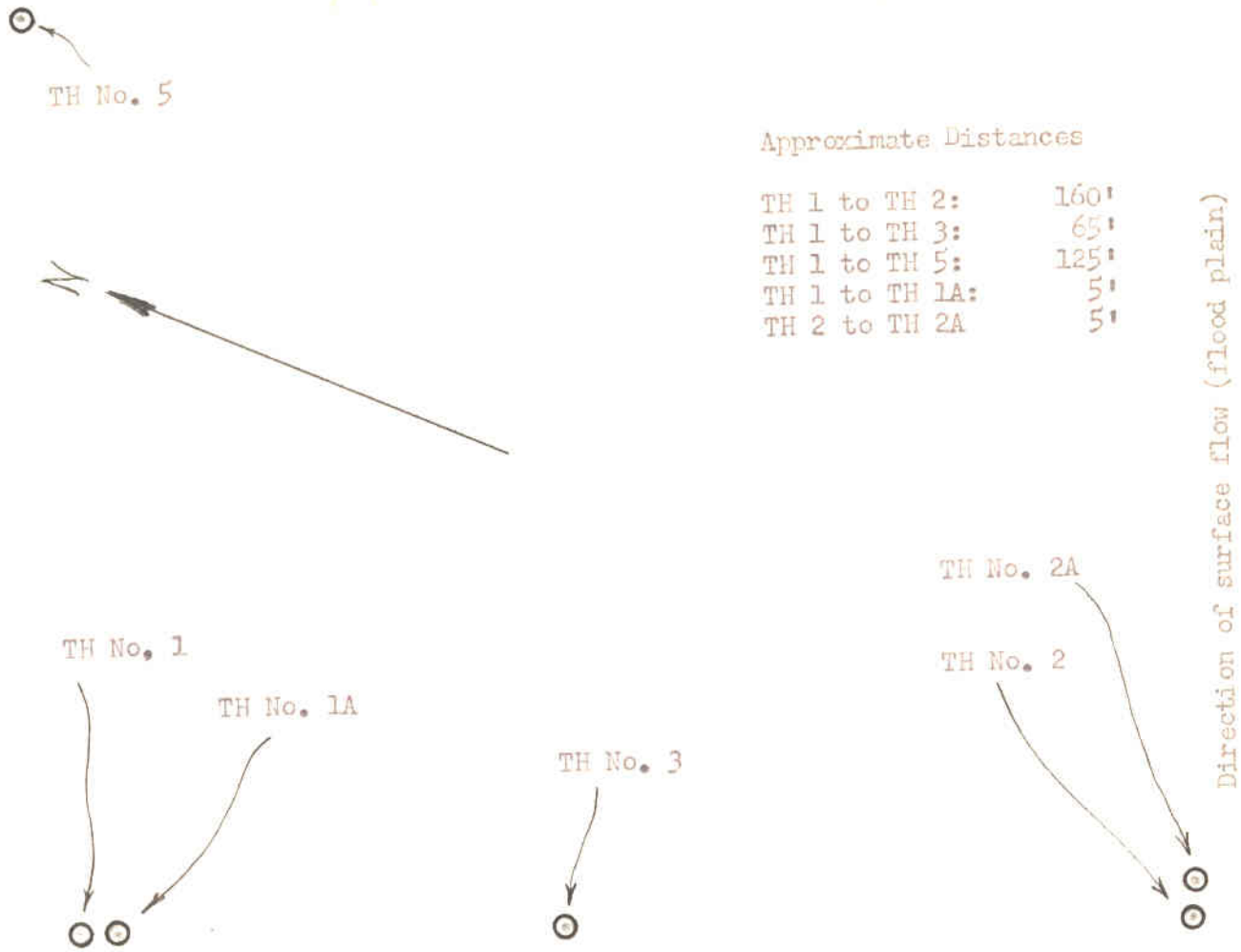
0	- 6'	Clay, sand and boulders
6	- 23½'	Silty fine sand with coarse gravel
23½		Bedrock

TH No. 5

P838

0	- 6'	Mud and sand
6	- 15'	Silty fine sand
15	- 23'	Silt and clay
23	- 33'	Fine silty sand
33		Bedrock

Note: Th No. 1A and TH No. 2A observation holes. Formation about same as in TH No. 1 and TH No. 2 respectively



Approximate Distances

TH 1 to TH 2:	160'
TH 1 to TH 3:	65'
TH 1 to TH 5:	125'
TH 1 to TH 1A:	5'
TH 2 to TH 2A	5'

Note: TH No. 4 located near Pump House, on west bank of river, upstream from highway bridge.

All test holes were 6" i.d. and were provided with adequate 5" i.d. screens.

Caisson Wells, Inc
33 West 42nd St., N. Y.

Underground Exploration for
Village of Brewster, N. Y.
Location Plan of Test Holes.
Sept. 22, 1952 BNY - 11

UNDERGROUND EXPLORATIONS FOR
VILLAGE OF BREWSTER, N.Y. PUMPING
TEST - Sept. 9, 1952

Time	Distance, top of casing to Water Level, ft.		Capacity
DST.	Pumping Well 1A (P839)	Observation Well 1 (P834)	G.P.M.
9:00 AM	5.17	6.75	0
9:15	7.33	7.75	50
9:30	8.25	8.67	"
10:00	9.33	10.00	"
10:15	10.00	10.33	"
11:15	10.92	11.50	"
11:45	11.33	11.83	"
12:00 N.	11.83	12.17	"
12:15 PM.	12.08	12.42	"
12:30	12.33	12.75	"
12:45	12.58	12.83	"
1:00	13.08	13.50	"
1:15	13.58	13.42	"
1:30	1358	13.67	"
1:45	13.67	13.83	"
2:00	13.92	14.00	"
2:15	14.17	14.25	"
2:30	14.25	14.42	"
2:45	14.58	14.58	"
3:00	14.83	14.75	"
3:30	15.33	14.92	40
4:00	15.67	15.08	"
4:15	15.00	15.08	"
4:30	15.17	15.17	"
4:45	15.67	15.33	"
5:00	15.67	15.33	"
5:25	15.58	15.50	33
5:45	15.58	15.50	"
5:46	Pump shut down		0
Recovery very slow			

5
15.58
5.17
10.41