UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

A RESISTIVITY SURVEY TO LOCATE AN AQUIFER IN THE GLACIAL DEPOSITS NEAR MARSHFIELD, WISCONSIN

Wood County

By

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ABSTRACT

A resistivity survey was made of an area near Marshfield, Wisconsin to locate in the glacial drift an aquifer which could be developed as a water supply for the city. One hundred and eighty five resistivity depth profiles were completed. The aquifer was found to be in a buried river channel, its extent was outlined by contouring the granite and all selected sites drilled produced water. Figures showing the locations of the drilled wells, depth profiles, surface contours and bedrock contours are given. The resistivity data are summarized in a table and given in complete form in the appendix. The apparent resistivity curves and well logs used for correlation are also given in the appendix.

INTRODUCTION

Marshfield, a growing community in the west-central part of Wisconsin, has long had a problem of obtaining an adequate water supply. Before the geophysical work herein described was undertaken, more than 200 test wells had been drilled in an attempt to meet the needs of the community, but only seventeen bore water in sufficient quantity to be developed as supply wells. A resistivity survey of the area was undertaken at the request of Mr. Frank C. Foley, District Geologist, of the U. S. Geological Survey's Ground Water Branch office at Madison, Wisconsin and Mr. E. F. Bean, State Geologist of Wisconsin. It was expected that the results would be of benefit not only to Marshfield but also to other communities of the area in need of additional water supplies.

The objectives of the investigation were: to locate subsurface gravel deposits and determine their character, depth and thickness; to determine the thickness of the glacial drift; to map the top of the pre-Cambrian granite; to locate the buried channel of the pre-glacial Little Eau Plaine River; and to select sites for drilling wells. Previous drilling had shown that the aquifers were in the gravel deposits, consequently their location was the most important objective of the investigation.

Marshfield is near the northwest corner of Wood County. The area in which the resistivity survey (figure 1) was made is in both Marathon and Wood Counties. As is shown in this figure, the greatest part of the work was done in the area northeast of the city. Work was started here because previous drilling information indicated it to be the best possibility for sand and gravel aquifers.

The field measurements were made during two field seasons, July 11 to 29, 1949 and May 31 to August 24, 1950. We were assisted in this work by members of the Madison office staff. Preliminary interpretations of the apparent resistivity curves were made in the field upon completion of the plotting; final interpretations were made and the report prepared by Spicer.

The assistance and favors extended to us by Mr. E. F. Kipp and his associates of the Marshfield Electric and Water Department are gratefully acknowledged. Cooperation and assistance were also given by Mr. Ernest F. Bean, State Geologist, Frank C. Foley, District Geologist, Ground Water Branch office of the Geological Survey, William J. Drescher and Eugene Daniel.

GEOLOGY OF THE AREA

Southwestern Marathon County and northwestern Wood County lie in the older drift area of the Northern Highland part of the state. (Martin, 1932). The thickness of the drift of the first glacial epoch ranges from 0 to 170 feet, or even more in a few places. The soils of the area are chiefly clayey or sandy loam. There is no thick residual soil; the transported soil is somewhat weathered, some of the minerals having been changed to clay 10 to 15 feet below the surface. The bedrock is principally pre-Cambrian granite (Weidman & Schultz, 1915) but some quartzite is present, as in Rib Hill in central Marathon County. Marshfield is located upon a relatively thick ridge of clay which slopes gently to the north and south. The lakes in the area have practically all been filled or drained, but some of the stream systems still show glacial characteristics. In general the surface has erosional rather than depositional characteristics. The topographic features, according to Chamberlin (1873-78) are due to the contour of the underlying rock.

Surface contours, based on altimeter readings referred to known bench marks, are shown on figure 2. Altitudes are given at each depth profile. None were taken at the test wells.

INSTRUMENTATION AND FIELD METHODS OF THE RESISTIVITY STUDIES

The resistivity measurements were all made with Gish-Rooney type Earth-Resistivity Apparatus with modifications by us. Power for driving the commutator in the instrument was obtained from the truck storage

battery, and power for the current circuit to energize the earth was supplied by a bank of Super "B" batteries. Taps for various voltages were brought out to a control panel, and rheostats were included in the circuit to adjust the amount of current flowing in the earth through the current side of the instrument. The electrodes used for making contact with the earth, potential and current, were copperclad steel rods about 26 inches long with a hexagonal steel driving head on one end and a sharpened point on the other. Wire for connecting the electrodes to the instrument was stranded bronze with synthetic rubber insulation, and was carried on duralumin reels. Each electrode was carefully "mudded in" at each interval to maintain good contact with the earth.

Resistivity depth profiling was used throughout the study in order to obtain all the information needed. Electrodes were set in the earth according to the modification of the Wenner arrangement proposed by F. W. Lee (Lee and others, 1929). Measurements of potential were made by both the Wenner (1915) and Lee techniques, thus giving three measurements at each interval. The apparent resistivities were computed by the Wenner (1915) formula, $\rho_a = 2\pi a \frac{E}{I}$, for all the observations, thus giving three apparent resistivity curves which when plotted are on the chart making them more accessible for interpretation. The curve form, however, remains the same. The three resistivity curves obtained are termed Full, P-1 and P-2. Bearings for the depth profiles are referred to true north and are given for the P-1 direction. Altitudes are expressed as heights above mean sea level.

INTERPRETATION OF THE RESISTIVITY CURVES

An apparent resistivity curve expresses graphically the behavior of an electrical field impressed on the earth. The curve by means of its slope, inflections, and other characteristics to be pointed out, enables a determination to be made of the materials beneath the surface of the earth. The method of interpreting such a curve is not quick or easy and for a complete comprehension demands a knowledge of the theoretical and mathematical considerations related to it. The method of interpretation to be designated was selected because it is founded upon theoretical and mathematical considerations, and also because it has been found, in our experience, to be more reliable than any of the other theoretical or empirical methods that are described in the literature of geophysics.

The method of interpretation applies to resistivity curves of two, three, and more layers. The theory of images, as given by Jeans (1925) and others, is fundamental. Theoretical aspects relating to the application of images to resistivity curves are given by Hummel (1931). Two-layer resistivity curves and as many methods of interpreting them will be found in a paper by Roman (1931). Three-layer resistivity curves will be found in an article by Wetzel and McMurry (1937) and the use of two-layer curves and Wetzel and McMurry three-layer curves to aid in the interpretation of three and more layer curves is completely explained by Watson and Johnson (1938). Assistance in understanding their treatment of image theory will be found in an article by Watson (1934).

The method described by Tagg (1937) is useful at times for certain types of resistivity curves. Examples of its application will be found in the reference cited and in Heiland (1940) and in the present paper.

It has been demonstrated by both theory and model studies that surface resistivity curves should be a series of smooth curves for two, three, four, and more layers, and should be amenable to the interpretation procedures pointed out above. While we recognize the fact that the earth is not so nicely bedded or layered as theory must assume, it has been our experience that this irregularity is a minor factor in comparison to carelessness in taking data for resistivity curves. If one does not get smooth curves then it is time to examine carefully the instruments in use, the techniques of measurement, and the site chosen for the observations. If the latter is at fault, select a site more carefully for the next line of observations. If it is found that the instrumentation or techniques are at fault, others should be tried or the source of trouble found and corrected. There are, no doubt, specific instances or certain localities where the generalization above, regarding a chosen site, will not hold, but an experienced operator will readily recognize such a geological condition.

SUMMARY OF INTERPRETATIONS

One hundred and eighty five resistivity depth profiles were completed in the Marshfield area. However, two were abandoned because it was not possible to get satisfactory measurements; the reason for the erratic behavior on these depth profiles was not ascertained. The centers of the

depth profiles and the directions of the electrode lines are shown on figure 1, the circle represents the center and the line through the circle the direction. The filled circles on figure 1 indicate the location of test wells which were used in the correlation of the resistivity interpretation with the drilling information. A complete listing of the locations of test wells which were used for correlation with respect to resistivity line centers is given in table 1. Logs for these test wells will be found in the Appendix. Depth profiles 1 to 51 inclusive were completed in July 1949 and the remainder, 52 to 156, during the season of 1950.

Interpretations of the resistivity curves with a description of the materials also will be found in the appendix. Space does not permit a complete comparison of all these results used in correlation but an example is given below where the drill hole was put down on the site of the line center after the preliminary interpretations were made, namely 18E and 34-26-3-1. Additional comparisons may be made by using table 1 and the Appendix. Inspection of the apparent resistivity curve for 18E at the same time the above comparisons are made will emphasize the kind of curve expected in this area where there is gravel and an aquifer.

18 E. Description by resistivity	Feet	34-26-3-1 Drillers log	Feet
Dry sandy clay soil	0 - 1.3	Top soil	0 - 1
Clay and hardpan (?)	1.3 - 5.2	Brown clay	1 - 4
Sand and gravel	5.2 -21	Hardpan	4 - 6
Sand and gravel (water)	21 -71	Hardpan and gravel	6 - 14
Granite	71 -300	Sand and gravel	14 - 28
		Sand and gravel, dirty	28 - 33
		Sand, fine and coarse	33 - 57
		Blue clay	57 - 66
		Decomposed granite, sand rock, hard rock	66 - 71
		Granite	71

TABLE 1

LOCATION OF TEST WELLS WHICH WERE USED FOR CORRELATION

WITH RESPECT TO RESISTIVITY LINE CENTERS.

Resistivity Line	Test Well Location Sec. - T. - R. - Well No.	Location of well with respect to resistivity line
1	33 - 26 - 3 - 7	50 feet N.
2	33 - 26 - 3 - 16	143 feet SW.
3	33 - 26 - 3 - 16	1/16 mi. E.
5	33 - 26 - 3 - 6	1/4 mi. W.
	33 - 26 - 3 - 3	1/16 mi. WSW.
6	33 - 26 - 3 - 4	1/8 mi. E.
	33 - 26 - 3 - 5	1/8 mi. ENE.
17	33 - 26 - 3 - 2	1/8 mi. N.
	33 - 26 - 3 - 4	3/16 mi. WNW.
18	33 - 26 - 3 - 17	10 feet W.
18 E	34 - 26 - 3 - 1	Same place
32	28 - 26 - 3 - 5	1/16 mi. E.
	28 - 26 - 3 - 4	1/16 mi. W.
33	28 - 26 - 3 - 1	10 feet W.
37	4 - 25 - 3 - 7	1/8 mi. SW.
	4 - 25 - 3 - 5	1/8 mi. SW.
43	28 - 26 - 3 - 2	10 yds. SE.
50	30 - 26 - 3 - 3	1/16 mi. N.
62	15 - 25 - 3 - 1	50 yds. W.
76	16 - 25 - 3 - 10	5/8 mi. SW.
	16 - 25 - 3 - 7	About 3/16 mi. W.
77	16 - 25 - 3 - 10	About 1/3 mi. WSW.
	16 - 25 - 3 - 1	About 1/3 mi. SW.
	16 - 25 - 3 - 7	About 1/3 mi. NNE.
78	16 - 25 - 3 - 7	About 5/16 mi. WNW.
	16 - 25 - 3 - 10	About 1/4 mi. WSW.
79	16 - 25 - 3 - 10	About 5/16 mi. WNW.
95	7 - 25 - 3 - 6	About 100 yds. E.
96	7 - 25 - 3 - 6	5/8 mi. N.
99	3 - 25 - 3 - 1	1/8 mi. SW.
126	4 - 25 - 3 - 9	1/8 mi. NE.
	4 - 25 - 3 - 10	1/8 mi. NE.
127	4 - 25 - 3 - 3	100 yds. E.
	4 - 25 - 3 - 4	1/16 mi. SE.
128	4 - 25 - 3 - 12	3/16 mi. NE.
131	4 - 25 - 3 - 2	1/4 mi. W.
155	12 - 25 - 2 - 1	3/8 mi. SSE.
	12 - 25 - 2 - 2	3/8 mi. SSE.
156	1 - 25 - 2 - 1	1/8 mi. WSW.

Near the end of the work in 1949, after preliminary interpretations were completed, site 18E was chosen as the best site for a test well. The well was drilled and on completion was tested at 200 gallons per minute. Two additional sites were chosen later and drilled; one at depth profile 18 and the other near 99. Both were in the aquifer but, to our knowledge, were not tested for capacity.

The figure depicting contours on the bedrock surface and the location of the aquifer in the gravel as obtained from the 1949 interpretations was most certainly incomplete. It indicated a large depression in the bedrock with the gravels and sands of greatly varying thickness and clay content generally overlying it. With the interpretations of both years plotted the figure depicting contours on the bedrock is more realistic and is shown as figure 3. (It is noted that a buried river channel is present and both the channel and its tributaries are filled with sand and gravel. Part of this material may be alluvial but the major part is of glacial origin. As the older drift moved in from the northwest, according to Martin (1932) the old channel was probably filled largely with the sands and gravels it contained. At the boundary of sections 34 and 2 the buried stream bed is wide, with a divided channel. This divided channel, no doubt, also contributed to holding back sands and gravels with the consequent filling of the channel. It seems probable that the branching channel at the corner of sections 28, 27, 34 and 33 continues on around the large block of granite and enters the main stream again at the corner of sections 34, 35, 2 and 3.

The interpretations of the resistivity curves are summarized in table 2. This table gives the depths to the top and bottom, the thickness and the computed resistivity in ohm cms of the shallow and the deep gravel and sand deposits, the depth to granite and the altitude of the granite surface. In this table certain of the resistivity line centers are starred either once or twice. The ones having two stars are considered the best locations for drilling wells to obtain water; the ones having one star are considered possible sites with a fair chance of obtaining water.

DRILLING RECOMMENDATIONS

A study of all the drill logs and the interpretation of the resistivity curves conclusively indicates that the sands and gravels which make up the main aquifer are along the buried channel or its tributaries. Supply wells no. 16 and no. 18 are the best water producing wells previously located by drilling and are the ones closest to the channel (figure 3). The well on the Weigel farm, 3-25-3-1, is also along the channel and should be an excellent water well, for the sand and gravel is very clean, as is indicated by its resistivity of 68,750 ohm cms.

In selecting the sites for drilling future water wells (starred items of table 2) several factors have been considered. First, the gravel and sand must have adequate thickness; second, the bottom of the sand and gravel bed should have an altitude near 1,100 feet; third, the resistivity should be above 15,000 ohm cms, as lower values indicate higher clay content with correspondingly lower permeability; fourth, the site should, preferably, be located above the buried channel.

TABLE 2

COMPUTED DEPTH, THICKNESS, AND RESISTIVITY OF SHALLOW AND DEEP GRAVEL AND SAND DEPOSITS; DEPTH TO AND ALTITUDE OF GRANITE.

T-R-Sec.	Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface
		From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	(Mean Sea Level)
26/3E/33	1	4.6	18	13.4	15,770	-	-	-	-	46	1150
26/3E/33	2	12	47	35	64,060	47	79	32	8,430	79	1113
26-3-33	3	3.2	34	30.8	21,350	34	74	40	9,150	74	1123
26-3-33	4	1.4	5.7	4.3	28,650	5.7	52	46.3	7,850	52	1142
26-3-33	5	--	--	--	--	--	--	--	--	52	1138
26-3-33	6	--	--	--	--	7.2	37	29.8	9,513	37	1174
26-3-29	7	4.5	9	4.5	12,225	--	--	--	--	21	1223
26-3-29	8	--	--	--	--	--	--	--	--	61	1220
26-3-28	8A	7.5	15	7.5	9,740	--	--	--	--	66	1224
26-3-28	9**	4.6	26	21.4	8,500	38	62	24	37,050	126	1166
26-3-29	9A	8.8	18	9.2	22,220	--	--	--	--	114	1192
26-3-20	10	8	24	16	8,660	--	--	--	--	74	1221
26-3-20	11	--	--	--	--	--	--	--	--	50	1239
26-3-27	12	--	--	--	--	--	--	--	--	6	1183
26-3-28	13	--	--	---	--	--	--	--	--	24	1191
26-3-28	13N	--	--	--	--	--	--	--	--	12	1205
26-3-27	14	--	--	--	--	--	--	--	--	29	1173
26-3-21	15	9	19	10	8,595	--	--	--	--	55	1166
26-3-16	16	--	--	--	--	--	--	--	--	66	1186
26-3-33	17	7.5	22	14.5	49,070	--	--	--	--	22	1172
26-3-33	17A	--	--	--	--	--	--	--	--	8	1191
26-3-33	18**	6.8	13.5	6.7	69,500	13.5	50	36.5	25,930	50	1146
26-3-34	18E**	5.2	21	15.8	44,990	21	71	50	18,710	71	1122
26-3-33	18W	4.5	27	22.5	36,250	--	--	--	--	27	1166
26-3-34	18E2**	7.2	44	36.8	114,400	44	92	48	17,580	92	1104

RESISTIVITY - SOCER & EDWARDS

	Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface (Mean Sea Level)
		From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	
26-3-34	18E3	--	--	--	--	--	--	--	--	36	1183
35	19	9	27	18	31,310	--	--	--	--	54	1138
34	20**	9	36	27	61,650	36	42	6	18,450	42	1148
34	20E	--	--	--	--	--	--	--	--	26	1172
34	20EN	--	--	--	--	--	--	--	--	22	1188
34	20EN2	--	--	--	--	--	--	--	--	30	1193
25-3-4	21	5.7	22	16.3	54,350	--	--	--	--	22	1186
3	21E**	--	--	--	--	4.5	114	99.5	35,920	114	1100
3	21EN	4	16	12	24,900	16	29	13	8,545	29	1157
3	22	--	--	--	--	--	--	--	--	5	1236
3	22N	5	20	15	75,020	20	32	12	22,425	32	1158
3	22E	--	--	--	--	--	--	--	--	32	1166
3	22ER	2.4	9.6	7.2	14,750	--	--	--	--	10	1188
15	22EI	--	--	--	--	--	--	--	--	7.5	1175
	22E2	--	--	--	--	--	--	--	--	7.5	1188
	22E3	--	--	--	--	--	--	--	--	5	1207
	22E4	--	--	--	--	--	--	--	--	5.8	1201
	22E5	--	--	--	--	--	--	--	--	40	1130
	23	--	--	--	--	--	--	--	--	21	1169
	24	--	--	--	--	--	--	--	--	8.2	1176
	25**	2.8	22	19.2	62,350	22	58	36	54,000	58	1142
	26	--	--	--	--	9.6	45	35.4	46,680	45	1160
	26E	--	--	--	--	--	--	--	--	10	1210
	27	--	--	--	--	7.8	65	57.2	96,850	65	1146
	27E	3.8	23	19.2	32,450	--	--	--	--	23	1177
	28	--	--	--	--	--	--	--	--	31	1153
	29	--	--	--	--	--	--	--	--	10	1203
	30	--	--	--	--	--	--	--	--	7.5	1200
	31**	5.5	23	17.5	147,200	23	53	30	30,890	53	1157
	32	6.7	42	35.3	26,410	--	--	--	--	42	1176

Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface
	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	(Mean Sea Level)
33	4.9	17	12.1	22,940	--	--	--	--	68	1154
34	--	--	--	--	--	--	--	--	98	1180
35	--	--	--	--	--	--	--	--	74	1250
36	--	--	--	--	--	--	--	--	81	1223
37	--	--	--	--	7.8	46	36.2	7,910	72	1130
38**	8.8	53	44.2	116,500	53	112	59	22,960	112	1100
39**	8.5	17	8.5	58,930	17	64	47	47,150	64	1137
40	--	--	--	--	--	--	--	--	45	1141
41	--	--	--	--	7.5	48	40.5	11,380	48	1145
41E	--	--	--	--	--	--	--	--	29	1156
41S	--	--	--	--	--	--	--	--	48	1172
42	4.1	8.2	4.1	7,840	--	--	--	--	67	1205
43**	--	--	--	--	12.5	61	48.5	11,310	61	1185
44**	--	--	--	--	14	115	101	12,320	115	1122
45**	12	24	12	74,130	24	64	40	34,920	64	1159
46	--	--	--	--	--	--	--	--	14	1229
47	--	--	--	--	--	--	--	--	9	1236
48	--	--	--	--	--	--	--	--	15	1227
49	--	--	--	--	--	--	--	--	38	1236
50	--	--	--	--	--	--	--	--	17	1258
51	--	--	--	--	--	--	--	--	49	1233
52	--	--	--	--	10	40	30	17,350	120	1246
53	--	--	--	--	--	--	--	--	128	1203
54	--	--	--	--	--	--	--	--	39	1267
55	--	--	--	--	--	--	--	--	16	1267
56	--	--	--	--	--	--	--	--	16	1261
57	7.4	15	7.6	22,650	--	--	--	--	108	1218
58	--	--	--	--	7.8	29	21.2	9,480	167	1208
59	--	--	--	--	--	--	--	--	42	1222
60	--	--	--	--	--	--	--	--	48	1223

Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface
	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	(Mean Sea Level)
61	--	--	--	--	23	28	5	10,360	56	1198
62	--	--	--	--	18	72	54	8,370	72	1175
63	--	--	--	--	--	--	--	--	20	1207
63E	--	--	--	--	--	--	--	--	44	1180
64	--	--	--	--	--	--	--	--	56	1164
65	--	--	--	--	--	--	--	--	44	1167
66	--	--	--	--	--	--	--	--	14	1210
67	--	--	--	--	14	77	63	32,600	77	1164
68	--	--	--	--	11	44	33	8,475	69	1172
69	--	--	--	--	--	--	--	--	44	1212
70	--	--	--	--	--	--	--	--	51	1195
71*	--	--	--	--	10	53	43	10,190	53	1181
72	--	--	--	--	--	--	--	--	63	1163
73	--	--	--	--	--	--	--	--	68	1166
74*	--	--	--	--	14	56	42	35,700	63	1191
75	--	--	--	--	18	76	58	7,246	76	1168
76	--	--	--	--	21	58	37	17,970	58	1182
77	--	--	--	--	--	--	--	--	63	1168
78	--	--	--	--	14	46	32	15,820	59	1178
79	--	--	--	--	--	--	--	--	48	1198
80	--	--	--	--	--	--	--	--	36	1183
81	--	--	--	--	--	--	--	--	61	1164
82	--	--	--	--	--	--	--		27	1188
83	--	--	--	--	--	--	--	--	67	1143
84	--	--	--	--	12	15	3	10,210	73	1153
85	--	--	--	--	--	--	--	--	66	1161
86	--	--	--	--	--	--	--	--	89	1142
87	--	--	--	--	--	--	--	--	72	1172
88	13	37	24	14,950	37	83	46	9,310	83	1158
89	6.7	20	13.3	11,160	--	--	--	--	63	1228

Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface
	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	(Mean Sea Level)
90	6.6	20	13.4	15,300	--	--	--	--	75	1217
91	--	--	--	--	--	--	--	--	40	1251
92	--	--	--	--	--	--	--	--	67	1222
93	--	--	--	--	12	23	11	38,430	112	1211
94	--	--	--	--	10.4	21	10.6	13,960	84	1244
95	--	--	--	--	21	31	10	20,550	73	1205
96	--	--	--	--	--	--	--	--	73	1196
97	5	10	5	13,350	--	--	--	--	36	1216
98	--	--	--	--	--	--	--	--	11	1130
99	--	--	--	--	13	66	53	68,750	66	1124
100	--	--	--	--	--	--	--	--	9.8	1130
101	--	--	--	--	--	--	--	--	11	1133
102	--	--	--	--	--	--	--	--	6.6	1207
103	--	--	--	--	--	--	--	--	24	1217
104	--	--	--	--	--	--	--	--	12	1232
105	--	--	--	--	--	--	--	--	9.4	1205
106	--	--	--	--	--	--	--	--	4.2	1218
107	--	--	--	--	--	--	--	--	6.7	1226
108	--	--	--	--	--	--	--	--	34	1217
109	9.6	16	6.4	25,180	--	--	--	--	38	1217
110	--	--	--	--	--	--	--	--	36	1226
111	--	--	--	--	--	--	--	--	8.2	1239
111R	--	--	--	--	--	--	--	--	10	1235
112	--	--	--	--	12	52	40	9,220	52	1200
113	--	--	--	--	--	--	--	--	11.2	1232
114	--	--	--	--	8.6	42	33.4	50,420	42	1206
115	--	--	--	--	--	--	--	--	6	1222
115R	2.5	7.5	5	148,500	7.5	23	15.5	33,430	23	1214
116	--	--	--	--	--	--	--	--	18	1202
116R	3.4	13.6	10.2	--	--	--	--	--	13.6	1191

Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite	Altitude of Granite Surface
	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	Feet	(Mean Sea Level)
117*	9	37	28	64,480	37	60	23	11,550	60	1212
118	--	--	--	--	--	--	--	--	7	1220
119*	--	--	--	--	7.6	42	34.4	15,120	42	1155
120	--	--	--	--	--	--	--	--	6.5	1218
121	--	--	--	--	--	--	---	--	10	1249
122	--	--	--	--	--	--	--	--	12	1179
123	--	--	--	--	8.4	18	9.6	9,350	18	1164
124	--	--	--	--	9.2	24	14.8	49,150	36	1206
125	--	--	--	--	--	--	--	--	68	1155
126	--	--	--	--	--	--	--	--	82	1119
127	--	--	--	--	--	--	--	--	45	1154
128	--	--	--	--	--	--	--	--	115	~~1093~~ 1168
129*	--	--	--	--	35	47	12	8,325	47	1159
130*	--	--	--	--	31	42	11	9,375	42	1165
131	--	--	--	--	--	--	--	--	42	1164
132	--	--	--	--	--	--	-	--	22	1193
133	--	--	--	--	--	--	--	--	10	1213
134	--	--	--	--	--	--	--	--	8.8	1217
135	--	--	--	--	--	--	--	--	20	1215
136	--	--	--	--	--	--	--	--	46	1220
137	3.4	13.5	10.1	14,175	--	--	--	--	82	1218
138	--	--	--	--	9.6	46	36.4	8,163	46	1223
139	--	--	--	--	--	--	--	--	16	1252
140	--	--	--	--	--	--	--	--	11	1238
141	--	--	--	--	--	--	--	--	11	1239
142	5.4	21	15.6	20,220	--	--	--	--	50	1225
143	--	--	--	--	--	--	--	--	--	Abandoned
144	--	--	--	--	--	--	--	--	38	1226
145	--	--	--	-----	--	--	--	--	9.5	1211
146	--	--	--	--	--	--	--	--	15	1215

Resistivity Depth Profile	Shallow Gravel and Sand				Deep Gravel and Sand				Depth to Granite Feet	Altitude of Granite Surface (Mean Sea Level)
	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms	From Feet	To Feet	Thickness Feet	Computed Resistivity ohm cms		
147	--	--	--	--	--	--	--	--	72	1158
148	--	--	--	--	--	--	--	--	44	1199
149	--	--	--	--	--	--	--	--	67	1215
150	--	--	--	--	--	--	--	--	--	Abandoned
151	--	--	--	--	--	--	--	--	10.5	1250
152	--	--	--	--	--	--	--	--	9	1244
153	--	--	--	--	--	--	--	--	18	1202
154	--	--	--	--	--	--	--	--	47	1201
155	--	--	--	--	--	--	--	--	29	1209
156	--	--	--	--	--	--	--	---	23	1225

Locations indicated thus (**) are considered very good sites for drilling water wells.

Locations indicated thus (*) are considered possible sites for drilling water wells.

Recharge into the aquifer is from the surface as well as from the buried channel system. Granite outcrops in several places in the area so that rainfall may easily penetrate along its slopes. In addition, the ground surface above the aquifer is all low in altitude (figure 2) so that it forms a catchment basin for rain water percolation. However, the buried channel alone is an ideal aquifer since it is part of the pre-glacial Little Eau Claire River channel.

CONCLUSION

The geophysical studies using resistivity depth profiling methods were successful in all phases of the project. A buried river which contains a sand and gravel aquifer was outlined; the thickness of the glacial drift was determined; the top of the pre-Cambrian granite was contoured; and sites for drilling wells were selected, all of which when drilled produced water. In fact, one well at location 18E on a pumping test supplied 200 gallons per minute and has been in almost continuous use since it was completed.

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APPENDIX

Geological Materials as Determined by Resistivity Depth Profiling

Line 1. 50 feet S. of test hole 33-26-3-7 on W. side of road. NW¼SE¼NW¼NE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 50° E. Altitude 1196 feet.

Description	Depth in feet
Sandy clay soil	0 - 1.2
Clay and hardpan	1.2 - 4.6
Sand and gravel	4.6 - 18
Clay	18 - 46
Granite	46 - 200

Line 2. 143 feet N. 29° E. from supply well 33-26-3-16. SE¼SW¼NE¼NE¼ sec. 33, T. 26 N., R. 3 E. P-1 S. 74° E. Altitude 1192 feet.

Description	Depth in feet
Clay soil	0 - [illegible]
Clay	5.9 - 12
Sand and gravel, clean	12 - 47
Sand, gravel, clay	47 - 79
Granite	79 - 200

Line 3. 13 feet N. of center of NE¼ sec. 33, T. 26 N., R. 3 E. S. 87° W. of supply well 33-26-3-16. P-1 N. 65° E. Altitude 1197 feet.

Description	Depth in feet
Clay and coarse gravel	0 - 1.6
Clay	1.6 - 3.2
Gravel	3.2 - 34
Gravel, some clay	34 - 74
Granite	74 - 200

Line 4. 226 feet N. of center of NE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 35° E. Altitude 1194 feet.

Description	Depth in feet
Moist clay soil, boulders	0 - 1.4
Gravel	1.4 - 5.7
Clay, some gravel	5.7 - 52
Granite	52 - 220

Line 5. W. side of road in ditch 200 feet N. and 20 feet W. of NE¼NE¼ sec. 33, T. 26 N., R. 3 E. About 200 feet N. of test hole 33-26-3-6. P-1 N. 0° E. Altitude 1190 feet.

Description	Depth in feet
Coarse sand, clay	0 - 0.8
Clay	0.8 - 3.1
Clay with sand or gravel	3.1 - 12
Clay	12 - 52
Granite	52 - 200

Line 6. SW¼NE¼SW¼NE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 60° W. Altitude 1211 feet.

Description	Depth in feet
Sand and clay soil	0 - 2.4
Clay	2.4 - 7.2
Gravel, some clay	7.2 - 37
Granite	37 - 200

Line 7. 0.1 mile N. of SE. cor. sec. 29, T. 26 N., R. 3 E. along W. side of C.T.H. "E". P-1 N. 0° E. Altitude 1244 feet.

Description	Depth in feet
Clay with sand	0 - 2.2'
Clay	2.2 - 4.5'
Gravel, some clay	4.5 - 9
Clay, some gravel	9 - 21
Granite	21 - 300

Line 8. 0.32 mile N. of sec. cor. 29, T. 26 N., R. 3 E. on W. side of C.T.H. "E". P-1 W. 0° E. Altitude 1281 feet.

Description	Depth in feet
Clay with sand and gravel	0 - 3.7
Gravel with some clay	3.7 - 5
Clay, sand, gravel	5 - 61
Granite	61 - 200

Line 8A. 430 feet E. of C.T.H. "E" and 0.44 mile S. of NW. cor. sec. 28, T. 26 N., R. 3 E. P-1 S. 66° E. Altitude 1290 feet.

Description	Depth in feet
Sandy clay or till	0 - 1.9
Clay, some sand or gravel	1.9 - 7.5
Gravel, some clay	7.5 - 15
Clay, some sand or gravel	15 - 66
Granite	66 - 280

Line 9. 0.7 mile N. of SW. cor. sec. 28, T. 26 N., R. 3 E. and 30 feet E. of C.T.H. "E". P-1 N. 0° E. Altitude 1292.

Description	Depth in feet
Clay, soil with sand and gravel	0 - 1.6
Clay	1.6 - 4.6
Gravel and clay	4.6 - 26
Clay, some gravel	26 - 38
Gravel	38 - 62
Clay or silt	62 - 126
Granite	126 - 500

This line center may lie over or nearly over an old channel.

Line 9A. 0.12 mile S. of NE. cor. sec. 29, T. 26 N., R. 3 E. and 30 feet W. of C.T.H. "E". P-1 N. 0° E. Altitude 1306 feet.

Description	Depth in feet
Gravel and clay soil	0 - 2
Clay	2 - 8.8
Gravel, some clay	8.8 - 18
Clay, some gravel	18 - 114
Granite	114 - 300

Line 10. In ditch 25 feet W. of C.T.H. "E" and 425 feet N. of SE. cor. sec. 20, T. 26 N., R.3 W. P-1 N. 0° E. Altitude 1295.

Description	Depth in feet
Sand and clay	0 - 2.1
Clay	2.1 - 8
Gravel, clay	8 - 22
Clay, some gravel	22 - 74
Granite	74 - 260

Line 11. 240 feet S. and 30 feet W. of NE cor. of $SE\frac{1}{4}$ sec. 20, T. 26 N., R. 3 E. In ditch 25 feet W. of center C.T.H. "E". P-1 N. 0° E. Altitude 1289 feet.

Description	Depth in feet
Sandy clay soil	0 - 2
Clay	2 - 4
Clay and gravel	4 - 18
Clay, some gravel	18 - 50
Granite	50 - 200

Line 12. 0.11 mile N. of Hwy. 97 and 30 feet E. of center C.T.H. in ditch. $SW\frac{1}{4}SW\frac{1}{4}$ sec. 27, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1189'.

Description	Depth in feet
Clay with sand and gravel	0 - 6.1
Granite	6.1 - 130

Line 13. 0.37 mile N. of Hwy. 97 and 487 feet W. of C.T.H. $SE\frac{1}{4}NE\frac{1}{4}SE\frac{1}{4}$ sec. 28, T. 26 N., R. 3 W. P-1 N. 70° E. Altitude 1215 feet.

Description	Depth in feet
Sandy clay soil	0 - 1.8
Clay	1.8 - 8
Clay, some gravel	8 - 24
Granite	24 - 200

Line 13N. 225 feet W. of C.T.H. "E" and 40 feet S. of ¼ line. SE¼NE¼ sec. 28, T. 26 N., R. 3 E. P-1 N. 10° E. Altitude 1217 feet.

Description	Depth in feet
Sand and clay soil	0 - 2.4
Clay	2.4 - 12
Granite	12 - 100

Line 14. 375 feet E. of C.T.H. and 30 feet S. of road in ditch. NW¼NW¼NW¼ sec. 27, T. 26N., R. 3 E. P-1 N. 90° E. Altitude 1202 feet.

Description	Depth in feet
Dry sandy clay	0 - 3.8
Clay	3.8 - 11
Clay, some gravel	11 - 29
Granite	29 - 200

Line 15. 15 feet E. of C.T.H. and 370 feet S. of ½ sec. line. NE¼SE¼ sec. 21, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1241 feet.

Description	Depth in feet
Clay, some sand	0 - 3
Clay	3 - 9
Clay, gravel	9 - 19
Clay, some gravel	19 - 55
Granite	55 - 260

Line 16. 20 feet N. of road SE¼SW¼SE¼ sec. 16, T. 26 N. R. 3 E. P-1 N. 0° E. Altitude 1252 feet.

Description	Depth in feet
Clay with boulders	0 - 5
Clay, some gravel	5 - 66
Granite	66 - 325
Possibility of gravel between 45 and 66 feet.	

Line 17. W. edge of road 0.4 mile S. of NE sec. cor. SE¼NE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1194 feet.

Description	Depth in feet
Sand with clay	0 - 8.6
Gravel, some sand	8.6 - 39
Granite	39 - 120

Bedrock may be deepening in P-2 direction.

Line 17A. 0.3 mile N. of sec. cor. and 30 feet W. of road. NE¼SE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1199 feet.

Description	Depth in feet
Clay soil with fine gravel	0 - 2
Clay	2 - 8
Granite	8 - 200

Line 18. 40 feet W. of road and 0.2 mi. N. of SE. sec. cor. near big pine tree. SE¼SE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1196 feet. X

TPSP USGS

Description	Depth in feet
Dry sandy clay soil	0 - 1.7
Clay (or hardpan?) some sand	1.7 - 6.8
Sand and gravel (or hardpan?)	6.8 - 13.5
Sand and gravel, water	13.5 - 50
Granite	50 - 200

Line 18E. 540 feet E. and 70 feet S. of Line 18. NW¼SW¼SW¼ sec. 34, T. 26 N., R. 3 E. P-1 S. 69° E. Altitude 1193 feet. X

SEBASTIAN

Description	Depth in feet
Dry sandy clay soil	0 - 1.3
Clay (and hardpan?)	1.3 - 5.2
Sand and gravel	5.2 - 21
Sand and gravel, water	21 - 71
Granite	71 - 300

Line 18W. 457 feet W. and 42 feet S. of Line 18. NW¼NE¼SE¼ sec. 33, T. 26 N., R. 3 E. P-1 N. 60° E. Altitude 1193'.

Description	Depth in feet
Dry clay, sand soil	0 - 1.1
Clay, some sand	1.1 - 4.5
Clean gravel	4.5 - 27
Granite	27 - 125

Line 18E2. 210 feet E. and 285 feet S. of NW. cor. SE¼SW¼ sec. 34, T. 26 N., R. 3 E. P-1 N. 4° W. Altitude 1196 feet.

Description	Depth in feet
Dry clay soil, sandy	0 - 1.8
Clay	1.8 - 7.2
Gravel, very clean	7.2 - 44
Gravel, some sand, water	44 - 92
Granite	92 - 300

Line 18E3. 0.16 mile S. and 440 feet E. of NW. cor. SE¼ sec. 34, T. 26 N., R. 3 E. P-1 N. 80° E. Altitude 1219 feet.

Description	Depth in feet
Sandy soil, some clay	0 - 2.5
Clay	2.5 - 12.5
Clay, some gravel	12.5 - 36
Granite	36 - 200

Line 19. 0.1 mi. N. of SE cor. and 350 feet W. of road sec. 33, T. 26 N., R. 3 E. P-1 S. 65° E. Altitude 1192 feet.

Description	Depth in feet
Dry sandy clay soil	0 - 2.3
Sandy clay (hardpan?)	2.3 - 9
Sand and gravel	9 - 27
Clay, some sand and gravel	27 - 54
Granite	54 - 225

Line 20. 470 feet E. and 15 feet N. of SW cor. sec. 34, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1190 feet.

Description	Depth in feet
Coarse dry sand, clay	0 - 9
Clean gravel	9 - 36
Gravel, some clay	36 - 42
Granite	42 - 300

Line 20E. 6 feet W. and 650 feet S. of NE. cor. of $SE\frac{1}{4}SW\frac{1}{4}$ sec. 34, T. 26 N., R. 3 E. P-1 N. 11° W. Altitude 1198 feet.

Description	Depth in feet
Moist sand, clay soil	0 - 2
Clay	2 - 2.7
Clay, some gravel	2.7 - 26
Granite	26 - 200

Line 20EN. 175 feet W. and 30 feet N. of SE. cor. of $NE\frac{1}{4}SW\frac{1}{4}$ sec. 34, T. 26 N., R. 3 E . P-1 N. 12° W. Altitude 1210 feet.

Description	Depth in feet
Clay soil, sandy, wet	0 - 2
Clay	2 - 3
Clay, some gravel	3 - 22
Granite	22 - 160

Line 20EN2. 450 feet W. and 2 feet S. of NE. cor. $SW\frac{1}{4}$ sec. 34, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1223 feet.

Description	Depth in feet
Clay soil, sandy, moist	0 - 1.4
Clay	1.4 - 30
Granite	30 - 160

Line 21. 330 feet N. and 300 feet W. of SE. cor. NE¼NE¼ sec. 4, T. 25 N., R. 3 E. P-1 N. 8° W. Altitude 1208 feet.

Description	Depth in feet
Clay, sand soil, dry	0 - 1.9
Clay	1.9 - 5.7
Gravel, clean	5.7 - 22
Granite	22 - 200

Line 21E. SW¼NW¼NW¼ sec. 3, T. 25 N., R. 3E. P-1 N. 87° E. Altitude 1214 feet.

Description	Depth in feet
Sandy clay soil	0 - 4.5
Gravel	4.5 - 114
Granite	114 - 300

Line 21EN. 0.3 mile E. of NW. cor. sec. 3, T. 25 N., R. 3 E. on S. side of road. P-1 S. 88° E. Altitude 1186 feet.

Description	Depth in feet
Sandy clay soil	0 - 4
Gravel	4 - 16
Gravel, sand, clay	16 - 29
Granite	29 - 180

Line 22. 15 feet N. and 420 feet W. of SE. cor. NW¼ sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1241 feet.

Description	Depth in feet
Dry coarse sand	0 - 4.6
Granite	4.6 - 125

Line 22N. 170 feet E. and 900 feet S. of NW. cor. NE¼ sec. 3, T. 25 N., R. 3 E. P-1 N. 2° E. Altitude 1190.

Description	Depth in feet
Sandy clay soil, wet	0 - 5
Gravel	5 - 20
Gravel, some sand	20 - 32
Granite	32 - 325

Line 22E. 100 feet W. of spring, 150 feet N. of road, SW. cor. SE 1/4 NE 1/4 sec. 3, T. 25 N., R. 3E. P-1 N. 70° E. Altitude 1198 feet.

Description	Depth in feet
Clay, sand, boulders	0 - 6
Clay	6 - 32
Granite	32 - 140

Line 22ER. 425 feet N. of SW. cor. SE 1/4 NE 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 3° E. Altitude 1198 feet.

Description	Depth in feet
Sand, boulders, clay	0 - 2.4
Gravel, sand, some clay	2.4 - 9.6
Granite	9.6 - 100

Line 22E1. SE 1/4 NW 1/4 NE 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1183.

Description	Depth in feet
Marshy soil boulders	0 - 7.5
Granite	7.5 - 100

Line 22E2. SE 1/4 SW 1/4 SE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1194 feet.

Description	Depth in feet
Sandy soil	0 - 2.3
Clay	2.3 - 7.5
Granite	7.5 - 100

Line 22E3. NW 1/4 SE 1/4 SE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 S. 89° E. Altitude 1212 feet.

Description	Depth in feet
Sandy soil	0 - 1.7
Clay	1.7 - 5
Granite	5 - 100

Line 22E4. SE cor. SW 1/4 NE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 S. 86° E. Altitude 1207 feet.

Description	Depth in feet
Sandy soil	0 - 2.9
Clay	2.9 - 5.8
Granite	5.8 - 100

Line 22E5. NW 1/4 SE 1/4 NE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1170.

Description	Depth in feet
Soil	0 - 6
Clay	6 - 40
Granite	40 - 200

Line 23. SW 1/4 NW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1190 feet.

Description	Depth in feet
Fine dry gravel	0 - 1.6
Clay, sand, gravel	1.6 - 21
Granite	21 - 200

Line 24. 15 feet E. of NW. cor. SW 1/4 NW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1184 feet.

Description	Depth in feet
Dry fine gravel	0 - 4.1
Clay, some gravel	4.1 - 8.2
Granite	8.2 - 100

Line 25. 460 feet W. and 15 feet N. of SE. cor. sec. 34, T. 26 N., R. 3 E P-1 N. 90° E. Altitude 1200 feet.

Description	Depth in feet
Dry sand, clay	0 - 2.1
Clay or hardpan	2.1 - 2.8
Gravel	2.8 - 22
Gravel, sand	22 - 58
Granite	58 - 200

Some possibility that granite is about 7 feet.

Line 26. 15 feet W. and 600 feet S. of NE. cor. SE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1205 feet.

Description	Depth in feet
Dry coarse sand and clay	0 - 2.4
Clay	2.4 - 9.6
Gravel	9.6 - 45
Granite	45 - 300

Line 26E. 2 feet N. and 650 feet W. of SE. cor. NE 1/4 SW 1/4 sec. 35, T. 26 N., R. 3 E. P-1 S. 53° E. Altitude 1220 feet.

Description	Depth in feet
Wet sandy soil	0 - 2.6
Clay, some sand	2.6 - 10.4
Granite	10.4 - 160

Line 27. 460 feet W. and 400 feet N. SE. cor. NE 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 5° W. Altitude 1211 feet.

Description	Depth in feet
Sandy clay soil, dry	0 - 2.0
Clay, some sand or gravel	2.0 - 7.8
Clean gravel	7.8 - 65
Granite	65 - 200

Line 27E. 6 feet S. of NE. cor. NW 1/4 SW 1/4 sec. 35, T. 26 N., R. 3 E. P-1 S. 70° E. Altitude 1200 feet.

Description	Depth in feet
Wet soil, clay, sand, boulders	0 - 1.9
Clay, some sand or gravel	1.9 - 3.8
Gravel, some sand	3.8 - 23
Granite	23 - 200

Line 28. 2 feet S. and 650 feet E. of SW. cor. NW 1/4 NW 1/4 sec. 35, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1184 feet.

Description	Depth in feet
Gravel, some clay	0 - 1.6
Clay, some gravel	1.6 - 6.5
Clay with gravel	6.5 - 31
Granite	31 - 200

Line 29. 4 feet E. and 0.1 mile N. of SW. cor. SE 1/4 sec. 33, T. 26 N., R. 3 E. P-1 S. 11° E. Altitude 1213 feet.

Description	Depth in feet
Sandy clay soil, dry	0 - 1.9
Clay	1.9 - 10
Granite	10 - 110

Line 30. 42 feet N. and 15 feet W. of SE. corner NW 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 12° W. Altitude 1217 feet.

Description	Depth in feet
Sand, clay soil	0 - 2
Clay	2 - 7.5
Granite	7.5 - 120

Line 31. NE 1/4 NW 1/4 sec. 33, T. 26 N., R. 3 E. 0.2 mile N. Hwy. 97 and 2 feet W. of center line. P-1 N. 25° E. Altitude 1210 feet.

Description	Depth in feet
Dry sand, clay soil	0 - 1.8
Clay	1.8 - 5.5
Gravel, clean	5.5 - 23
Gravel, sand, wet	23 - 53
Granite	53 - 200

Line 32. 0.1 mile E. of 1/2 line, 40 feet S. of 1/4 line, NW 1/4 SW 1/4 SE 1/4 sec. 28, T. 26 N., R. 3 E. P-1 S. 70° E. Altitude 1218 feet.

Description	Depth in feet
Dry sandy clay soil	0 - 1.7
Clay	1.7 - 6.7
Gravel, sand, some clay	6.7 - 42
Gravel, sand, little clay	42 - 190
Granite	190 - 400

Bedrock may be at 42 feet/ if so it is probably recemented fill.

Line 33. 95 feet N. of center of sec. 28, T. 26 N., R. 3 E. P-1 N. 62° E. Altitude 1222 feet.

Description	Depth in feet
Black soil, boulders	0 - 1.6
Clay and hardpan	1.6 - 4.9
Gravel, sand, some clay	4.9 - 17
Clay, some sand or gravel	17 - 68
Granite, probably weathered	68 - 400

Line 34. SW. cor. SW 1/4 NW 1/4 NE 1/4 sec. 28, T. 28 N., R. 3 E. P-1 N. 87° E. Altitude 1278 feet.

Description	Depth in feet
Black sandy soil	0 - 2
Clay, some gravel or sand	2 - 4.2
Clay, some sand and gravel	4.2 - 98
Granite	98 - 325

Line 35. NE. cor. SE 1/4 SE 1/4 SW 1/4 sec. 21, T. 26 N., R. 3 E. 565 feet N. of S. line. P-1 N. 0° E. Altitude 1324 feet.

Description	Depth in feet
Sand, boulders, clay	0 - 2.6
Clay	2.6 - 5.1
Clay, some gravel	5.1 - 24
Clay	24 - 74
Granite	74 - 325

Line 36. NW 1/4 SW 1/4 SE 1/4 sec. 21, T. 26 N., R. 3 E. P-1 N. 3° E. Altitude 1304 feet.

Description	Depth in feet
Clay, sand, boulders	0 - 3.2
Clay	3.2 - 4.3
Clay, some gravel and sand	4.3 - 81
Granite	81 - 300

Line 37. SW 1/4 SE 1/4 SE 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1202 feet.

Description	Depth in feet
Clay sand soil	0 - 3.9
Clay	3.9 - 7.8
Gravel, sand, clay	7.8 - 46
Clay	46 - 72
Granite	72 - 200

Line 38. 550 feet W. of NE. cor. SW 1/4 SE 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 7° W. Altitude 1212 feet.

Description	Depth in feet
Sand, clay, soil	0 - 2.2
Clay	2.2 - 8.8
Clean gravel	8.8 - 53
Gravel, water	53 - 112
Granite	112 - 250

Line 39. NW 1/4 NE 1/4 NW 1/4 SE 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 20° W. Altitude 1201 feet.

Description	Depth in feet
Dry sandy clay soil	0 - 2.1
Clay	2.1 - 8.5
Gravel	8.5 - 17
Gravel, sand, water	17 - 64
Granite	64 - 250

Line 40. NE. cor. of NW 1/4 NW 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1186 feet.

Description	Depth in feet
Clay, sand soil	0 - 2.4
Clay	2.4 - 5.1
Clay, sand, gravel	5.1 - 45
Granite	45 - 200

Line 41. 30 feet N. and 30 feet E. of SW. cor. NE 1/4 NW 1/4 sec. 34, T. 26 N., R. 3 E. Altitude 1193 feet.

Description	Depth in feet
Clay soil, some sand	0 - 1.9
Clay	1.9 - 7.5
Gravel, sand, clay	7.5 - 48
Granite	48 - 200

Line 41E. 150 feet N. of SE. cor. NE 1/4 NW 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 83° E. Altitude 1185 feet.

Description	Depth in feet
Clay	0 - 29
Granite	29 - 130

Line 41S. 80 feet N. of SW. cor. SE 1/4 NW 1/4 sec. 34, T. 26 N., R. 3 E. P-1 N. 88° E. Altitude 1220 feet.

Description	Depth in feet
Sandy clay soil	0 - 4.1
Clay	4.1 - 5.5
Clay, some sand and gravel	5.5 - 48
Granite	48 - 200

Line 42. 610 feet S. of N. line, 0.3 mile E. of W. line, NE 1/4 NW 1/4 sec. 28, T. 26 N., R. 3 E. P-1 N. 23° E. Altitude 1272 feet.

Description	Depth in feet
Clay, sand soil	0 - 2.7
Clay	2.7 - 4.1
Clay, gravel, sand	4.1 - 8.2
Clay, some gravel, sand	8.2 - 67
Granite	67 - 200

Line 43. NW 1/4 SW 1/4 SE 1/4 NW 1/4 sec. 28, T. 26 N., R. 3 E. P-1 N. 22° E. Altitude 1246 feet.

Description	Depth in feet
Dry sandy clay soil	0 - 6.2
Clay and hardpan	6.2 - 12.5
Sand, gravel, clay	12.5 - 61
Granite	61 - 225

Bedrock is either deeply weathered or else it is recemented material.

Line 44. NW 1/4 SW 1/4 NE 1/4 SW 1/4 sec. 28, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1237 feet.

Description	Depth in feet
Clay soil, damp	0 - 1
Sand, gravel	1 - 5
Clay	5 - 14
Gravel, sand, water	14 - 115
Granite	115 - 300

Line 45. 100 feet W. and 130 feet N. SE. cor. SW 1/4 SW 1/4 sec. 28, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1223 feet.

Description	Depth in feet
Clay soil, boulders	0 - 6
Clay	6 - 12
Gravel, dry	12 - 24
Gravel, water	24 - 64
Granite	64 - 200

Line 46. NW 1/4 NW 1/4 SE 1/4 NW 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1243 feet.

Description	Depth in feet
Sand, clay, soil	0 - 3.4
Clay	3.4 - 13.6
Granite	13.6 - 200

Line 47. NE 1/4 NW 1/4 SW 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1245 feet.

Description	Depth in feet
Clay, sand soil, boulders	0 - 2.2
Clay	2.2 - 9
Granite	9 - 200

Line 48. SE 1/4 NE 1/4 SW 1/4 SW 1/4 sec. 33, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1242 feet.

Description	Depth in feet
Sandy clay soil	0 - 3.4
Clay	3.4 - 15
Granite	15 - 200

Line 49. SW 1/4 NE 1/4 NE 1/4 sec. 30, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1274 feet.

Description	Depth in feet
Clay soil, sand	0 - 2
Clay	2 - 8
Clay, sand, gravel	8 - 16
Clay	16 - 38
Granite	38 - 200

Line 50. NE 1/4 SE 1/4 NW 1/4 SE 1/4 sec. 30, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1275 feet.

Description	Depth in feet
Clay	0 - 17
Granite	17 - 100

Line 51. SW 1/4 NE 1/4 NE 1/4 NE 1/4 sec. 32, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1282 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.1
Gravel and clay	2.1 - 4.2
Clay	4.2 - 7.8
Clay, sand, gravel	7.8 - 49
Granite	49 - 125

Line 52. 225 feet E. of SW. cor. sec. 32, T. 26 N., R. 3 E. P-1 N. 90° E. Altitude 1366 feet.

Description	Depth in feet
Gravelly clay soil	0 - 2.5
Clay and gravel	2.5 - 10
Gravel, sand, clay	10 - 40
Clay, some sand and gravel	40 - 120
Granite	120 - 300

Line 53. 630 feet N. of S. line SW 1/4 SE 1/4 NE 1/4 SW 1/4 sec. 31, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1331 feet.

Description	Depth in feet
Clay soil, gravel, wet	0 - 9
Gravel, some clay	9 - 18
Clay, sand, gravel	18 - 128
Granite	128 - 450

Line 54. 648 feet N. of SE. cor. SW 1/4 sec. 31, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1306 feet.

Description	Depth in feet
Sandy clay soil, wet	0 - 4.5
Clay	4.5 - 39
Granite	39 - 200

Line 55. 650 feet N. of S. line, NE 1/4 SE 1/4 SW 1/4 SW 1/4 sec. 31, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1283 feet.

Description	Depth in feet
Gravelly clay soil	0 - 4.4
Clay	4.4 - 16
Granite	16 - 200

Line 56. SE 1/4 NW 1/4 NW 1/4 sec. 6, T. 25 N., R. 3 E., P-1 N. 1° W. Altitude 1277 feet.

Description	Depth in feet
Sandy clay soil	0 - 4.5
Clay	4.5 - 16
Granite	16 - 200

Line 57. NE 1/4 SW 1/4 NE 1/4 sec. 6, T. 25 N., R. 3 E., P-1 N. 90° E. Altitude 1326 feet.

Description	Depth in feet
Sandy soil, boulders	0 - 1.8
Clay, sand, gravel	1.8 - 7.4
Sand, gravel, clay	7.4 - 15
Clay, sand, gravel	15 - 108
Granite	108 - 325

Line 58. 0.2 mile S. of NW. cor sec. 5, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1375 feet.

Description	Depth in feet
Sandy clay soil	0 - 5.8
Clay	5.8 - 7.7
Sand, gravel, clay	7.7 - 29
Clay, some sand and gravel	29 - 167
Granite	167 - 400

Line 59. NE. cor. NW 1/4 NW 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1264 feet.

Description	Depth in feet
Clay soil	0 - 4
Clay	4 - 42
Granite	42 - 140

Line 60. SE 1/4 SE 1/4 SW 1/4 sec. 10, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1271 feet.

Description	Depth in feet
Clay soil	0 - 5
Clay, sand, gravel	5 - 15
Clay	15 - 48
Granite	48 - 200

Line 61. 0.15 mile S. of NE. cor. sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1254 feet.

Description	Depth in feet
Clay soil and clay	0 - 23
Gravel	23 - 28
Clay	28 - 56
Granite	56 - 200

Line 62. SE 1/4 SE 1/4 NE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1247 feet.

Description	Depth in feet
Wet clay soil	0 - 18
Gravel, clay, shale (?) silt	18 - 72
Granite	72 - 200

Line 63. SW 1/4 NW 1/4 SW 1/4 sec. 14, T. 25 N., R. 3E. P-1 N. 0° E. Altitude 1227 feet.

Description	Depth in feet
Clay soil, some gravel	0 - 10
Clay	10 - 20
Granite	20 - 200

Line 63 E. 325 feet E. of SW. cor. NW 1/4 SW 1/4 sec. 14, T. 25 N., R. 3 E. Altitude 1224 feet.

Description	Depth in feet
Clay soil, sandy	0 - 4.1
Clay	4.1 - 44
Granite	44 - 200

Line 64. 375 feet E. of NW cor. sec. 23, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1220 feet.

Description	Depth in feet
Clay soil, some sand or gravel	0 - 56
Granite	56 - 200

Line 65. 350 feet S. of NW. cor. NE 1/4 NE 1/4 sec. 22, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1211 feet.

Description	Depth in feet
Clay soil, some sand or gravel	0 - 44
Granite	44 - 200

Line 66. NW 1/4 SE 1/4 SE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1225 feet.

Description	Depth in feet
Moist clay soil, sand, gravel	0 - 7
Clay	7 - 14
Granite	14 - 100

It is probable that granite is $\gg$ 14 feet as the observations were not extended far enough.

Line 67. 100 feet E. of cor. NW 1/4 NE 1/4 SE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1241 feet. +?

Description	Depth in feet
Clay soil, some sand or gravel	0 - 9.5
Clay	9.5 - 14
Gravel and sand	14 - 77
Granite	77 - 250

Line 68. NW. cor. SW 1/4 SW 1/4 NE 1/4 NE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 S. 70° E. Altitude 1241 feet.

Description	Depth in feet
Moist sandy clay soil	0 - 2.6
Clay	2.6 - 11
Sand, gravel, clay	11 - 44
Clay	44 - 69
Granite	69 - 300

Line 69. NW. cor. SW 1/4 NE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1256 feet.

Description	Depth in feet
Clay soil, sandy	0 - 3.2
Clay	3.2 - 7.6
Clay, sand, gravel	7.6 - 44
Granite	44 - 200

Line 70. Sw cor. SW 1/4 NE 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1246 feet.

Description	Depth in feet
Sandy clay soil	0 - 1.9
Clay	1.9 - 7.6
Sand, gravel, clay	7.6 - 51
Granite	51 - 200

Line 71. SE. cor. NE 1/4 SW1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1234 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.5
Clay	2.5 - 10
Sand, gravel, some clay	10 - 53
Granite	53 - 200

Depth to granite decreasing rapidly in P-2 direction.

Line 72. NW 1/4 NW 1/4 NE 1/4 sec. 22, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1226 feet.

Description	Depth in feet
Sandy clay soil	0 - 5
Clay	5 - 20
Sand, gravel, clay	20 - 63
Granite	63 - 200

Line 73. SE 1/4 SW 1/4 SW 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1234 feet.

Description	Depth in feet
Moist clay soil, some gravel	0 - 6
Sand, gravel, clay	6 - 8
Clay, some gravel, sand	8 - 68
Granite	68 - 200

Line 74. SE 1/4 NW 1/4 SW 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1254 feet.

Description	Depth in feet
Sandy, gravelly clay soil	0 - 5.4
Clay	5.4 - 14
Sand and gravel	14 - 56
Clay, sand, gravel	56 - 63
Granite	63 - 200

Line 75. SE 1/4 SW 1/4 SE 1/4 NW 1/4 NW 1/4 sec. 15, T. 25 N., R. 3 E. P-1 N. 3° W. Altitude 1244 feet.

Description	Depth in feet
Clay soil, boulders	0 - 4.6
Clay	4.6 - 18
Sand, gravel, clay	18 - 76
Granite	76 - 200

Line 76. SE 1/4 NE 1/4 NE 1/4 sec. 16, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1240 feet.

Description	Depth in feet
Black soil	0 - 2.3
Clay	2.3 - 9.2
Gravelly clay	9.2 - 12
Silty clay	12 - 21
Gravel, sand, some clay	21 - 58
Granite	58 - 200

Line 77. SE 1/4 SE 1/4 NE 1/4 sec. 16, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1231 feet.

Description	Depth in feet
Sandy clay soil	0 - 2
Clay	2 - 12
Sand, gravel, clay	12 - 63
Granite	63 - 200

Line 78. NE cor. SE 1/4 SE 1/4 sec. 16, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1237 feet.

Description	Depth in feet
Clay, sandy	0 - 3.4
Clay	3.4 - 14
Sand, gravel, some clay	14 - 46
Clay, decomposed granite	46 - 59
Granite	59 - 200

Line 79. 180 feet N. of SW. cor. sec. 15, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1246 feet.

Description	Depth in feet
Clay soil, clay	0 - 7.2
Clay	7.2 - 9.6
Clay, sand rock (?) gravel	9.6 - 48
Granite	48 - 160

Line 80. SE cor. NE 1/4 NE 1/4 sec. 21, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1219 feet.

Description	Depth in feet
Clay soil, some gravel	0 - 2
Clay	2 - 8
Clay, sand, gravel	8 - 36
Granite	36 - 200

Line 81. NW cor. SE 1/4 NW 1/4 sec. 22, T. 25 N., R. 3 E. P-1 S. 86° E. Altitude 1225 feet.

Description	Depth in feet
Sandy clay soil	0 - 4.5
Clay	4.5 - 6.8
Clay, sand, gravel	6.8 - 61
Granite	61 - 180

Line 82. SW. cor. SE 1/4 NW 1/4 NE 1/4 sec. 22, T. 25 N., R. 3 E. P-1 S. 87° E. Altitude 1215 feet.

Description	Depth in feet
Clay soil	0 - 4.2
Clay, sand, gravel	4.2 - 12
Clay	12 - 27
Granite	27 - 200

Line 83. 395 feet N. of 1/4 line SW 1/4 NE 1/4 NE 1/4 sec. 22, T. 25 N., R. 3 E. P-1 N. 5° E. Altitude 1210 feet.

Description	Depth in feet
Soil, clay	0 - 6
Clay, sand, gravel	6 - 67
Granite	67 - 250

Line 84. 300 feet E. of SW. cor. NW 1/4 NW 1/4 sec. 23, T. 25 N., R. 3 E. Altitude 1226 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.8
Clay, sand, gravel	2.8 - 11.5
Sand, gravel, clay	11.5 - 15
Clay, sand, gravel	15 - 73
Granite	73 - 200

Line 85. 600 feet S. of NE. cor. NW 1/4 NW 1/4 sec. 23, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1227 feet.

Description	Depth in feet
Soil, clay	0 - 66
Granite	66 - 250
Some sand or gravel probable about 40 to 50 feet.	

Line 86. SE 1/4 NW 1/4 SW 1/4 sec. 14, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1231 feet.

Description	Depth in feet
Clay soil, some sand and cobbles	0 - 5
Clay	5 - 10
Clay, sand, gravel	10 - 89
Granite	89 - 300

Line 87. 300 feet S. of NW. cor. NE 1/4 SW 1/4 sec. 14, T. 25 N., R. 3 E. P-1 N. 2° E. Altitude 1245 feet.

Description	Depth in feet
Clay soil, sand gravel	0 - 5
Clay	5 - 6.8
Clay, sand, gravel	6.8 - 72
Granite	72 - 250

Line 88. 1000 feet S. of NE. cor. NW 1/4 NW 1/4 sec. 14, T. 25 N., R. 3 E. P-1 N. 2° W. Altitude 1241 feet.

Description	Depth in feet
Sandy clay soil	0 - 6.5
Clay	6.5 - 13
Gravel, sand	13 - 37
Gravel, sand, some clay, water	37 - 83
Granite	83 - 300

Line 89. NE. cor. SE 1/4 SE 1/4 sec. 13, T. 25 N., R. 2 E. P-1 N. 2°W. Altitude 1241 feet.

Description	Depth in feet
Clay soil, sand	0 - 6.7
Gravel, sand, clay	6.7 - 20
Clay	20 - 63
Granite	63 - 325

Line 90. NW. cor. NW 1/4 SW 1/4 sec. 18, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1292 feet.

Description	Depth in feet
Clay soil, sand, gravel	0 - 6.6
Gravel, sand	6.6 - 20
Clay, some gravel or sand	20 - 75
Granite	75 - 400

Line 91. NW. cor. SW 1/4 NW 1/4 sec. 18, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1291 feet.

Description	Depth in feet
Clay soil, cobbles	0 - 27
Clay	27 - 40
Granite	40 - 300

Line 92. 200 feet N. of SE. cor. NW 1/4 SE 1/4 sec. 12, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1289 feet.

Description	Depth in feet
Clay soil, sand	0 - 5.7
Clay, some sand	5.7 - 67
Granite	67 - 325

Line 93. SE. cor. NW 1/4 NE 1/4 sec. 13, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1323 feet.

Clay soil, sand, gravel	0 - 2.9
Clay, sand, gravel	2.9 - 11.6
Sand, gravel	11.6 - 23
Clay, sand, gravel	23 - 112
Granite	112 - 325

Line 94. NE. cor. NW 1/4 NE 1/4 sec. 13, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1328 feet.

Description	Depth in feet
Clay soil, sand, gravel	0 - 2.6
Clay, some sand and gravel	2.6 - 10.4
Sand, gravel	10.4 - 21
Clay	21 - 84
Granite	84 - 250

Line 95. 0.35 mile N. of SE. cor. sec. 12, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1278 feet.

Description	Depth in feet
Clay, gravel, sand	0 - 21
Gravel, sand, stones	21 - 31
Clay, some gravel and sand	31 - 73
Granite	73 - 325

Line 96. 450 feet W. of SE. cor. sec. 1, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1269 feet.

Description	Depth in feet
Clay soil, gravel, sand	0 - 21
Clay, some sand and gravel	21 - 73
Granite	73 - 325

Line 97. 3/8 mile N. of SW. cor. sec. 6, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1252 feet.

Description	Depth in feet
Clay soil, cobbles	0 - 5
Sand, gravel, clay	5 - 10
Clay, some sand and gravel	10 - 36
Granite	36 - 200

Line 98. 0.1 mile S. of NE. cor. sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1191 feet.

Description	Depth in feet
Clay soil, sand	0 - 5.5
Clay	5.5 - 11
Granite	11 - 200

Line 99. 400 feet S. of road and 0.45 mi. W. of NE. cor. sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1190 feet.

66
1124

Description	Depth in feet
Black loam soil, gravel	0 - 9.8
Clay	9.8 - 13
Clean sand and gravel	13 - 66
Granite	66 - 250

Line 100. 800 feet S. and 0.4 mile W. of NE. cor. sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1190 feet.

Description	Depth in feet
Black loam soil	0 - 9.8
Granite	9.8 - 200

Line 101. 550 feet SW. of NE. cor. sec. 4, T. 25 N., R. 3 E. P-1 N. 26° E. Altitude 1194 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.2
Clay	2.2 - 11
Granite	11 - 200

Line 102. 1/4 mile S. of NE. cor. sec. 4, T. 25 N., R. 3 E., P-1 N. 0° E. Altitude 1214 feet.

Description	Depth in feet
Sandy clay soil	0 - 3.3
Clay	3.3 - 6.6
Granite	6.6 - 200

Line 103. 1/2 mile S. of NE. cor. sec. 4, T. 25 N., R. 3 E., P-1 N. 0° E. Altitude 1241 feet.

Description	Depth in feet
Gravel, clay	0 - 3
Clay	3 - 9
Gravel, sand, clay	9 - 24
Granite	24 - 200

Line 104. 75 feet E. of 1/4 line, 437 feet N. of road, SW. cor. SE 1/4 NW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 2° E. Altitude 1244 feet.

Description	Depth in feet
Loam soil, some gravel	0 - 12
Granite	12 - 400
Granite surface is very irregular.	

Line 105. 63 feet N. of SE. cor. NW 1/4 NW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 86° E. Altitude 1214 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 9.4
Granite	9.4 - 100

Line 106. 450 feet S. of NE. cor. SE 1/4 NW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 3° E. Altitude 1222 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 4.2
Granite	4.2 - 250

Along a granite ridge, bedrock surface is very irregular.

Line 107. 85 feet E. of road, NW. cor. SW 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1233 feet.

Description	Depth in feet
Loam soil, stones	0 - 1.7
Clay	1.7 - 6.7
Granite	6.7 - 300

Line 108. 523 feet E. of SW. cor. SW 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1251 feet.

Description	Depth in feet
Clay soil, sand, boulders	0 - 2.4
Clay	2.4 - 4.8
Clay, sand, gravel	4.8 - 34
Granite	34 - 300

Line 109. SE. cor. SW 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1255 feet.

Description	Depth in feet
Clay soil, sand, gravel	0 - 2.4
Clay, some sand and gravel	2.4 - 9.6
Sand, gravel	9.6 - 16
Clay, some sand and gravel	16 - 38
Granite	38 - 400

Line 110. 150 feet W. of and 155 feet N. of 1/4 line, SE. cor. NW 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1262 feet.

Description	Depth in feet
Clay soil, sand, gravel	0 - 18
Clay, some sand and gravel	18 - 36
Granite	36 - 450

Line 111. SE. cor. NE 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1247 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 8.2
Granite	8.2 - 200

Line 111R. 270 feet E. and 300 feet N. of 1/4 line NW 1/4 SE 1/4 sec. 3, T. 25 N., R. 3 E. P-1 S. 85° E. Altitude 1245 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 110
Granite	10 - 200

Line 112. SE. cor. SE 1/4 SW 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1252 feet.

Description	Depth in feet
Clay soil, sand	0 - 3
Clay, some sand and gravel	3 - 12
Sand, gravel	12 - 52
Granite	52 - 300

Line 113. NE. cor. SW 1/4 SE 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1243 feet.

Description	Depth in feet
Clay soil, sand	0 - 2.8
Clay	2.8 - 11.2
Granite	11.2 - 400

Line 114. SE. cor. SW 1/4 SE 1/4 sec. 3, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1248 feet.

Description	Depth in feet
Clay, sand, gravel	0 - 8.6
Sand, gravel, clean	8.6 - 42
Granite	42 - 400

Line 115 . 0.1 mile E. and 150 feet S. of road, NW. cor. NW 1/4 NW 1/4 sec. 11, T. 25 N., R. 3 E. P-1 N. 85° E. Altitude 1228 feet.

Description	Depth in feet
Sandy clay	0 - 6
Granite	6 - 35

Erratic because of metal fence distortion.

Line 115R. 375 feet E. and 330 feet S. of road, NW 1/4 NW 1/4 sec. 11, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1237 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.5
Gravel, sand, clean	2.5 - 7.5
Gravel, sand, some clay, water	7.5 - 23
Granite	23 - 250

Line 116. 0.22 mile E. of SE. cor. SW 1/4 SW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1220 feet.

Description	Depth in feet
Sandy clay soil	0 - 18.5
Granite	18.5 - 200

Line 116R. 330 feet N. of line 116. P-1 N. 90° E. Altitude 1205 feet.

Description	Depth in feet
Sandy clay soil	0 - 3.4
Sand, gravel, clay	3.4 - 13.6
Granite	13.6 - 300

Line 117. 110 feet N. of 1/4 line, 0.22 mile E. of road in SE. cor. NW 1/4 SW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1219 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.2
Clay, some sand	2.2 - 9
Sand, gravel	9 - 37
Sand, gravel, some clay, water	37 - 60
Granite	60 - 200

Line 118. 50 feet E. and 174 feet S. of NW. cor. SW 1/4 SW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 3° W. Altitude 1227 feet.

Description	Depth in feet
Clay soil, sand	0 - 7
Granite	7 - 100

Line 119. 465 feet N. of 1/4 line, SW. cor. SE 1/4 NW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1197 feet.

Description	Depth in feet
Clay soil, sand	0 - 3.8
Clay	3.8 - 7.6
Sand, gravel, probably water	7.6 - 42
Granite	42 - 200

Line 120. 465 feet N. of SE. cor. NW 1/4 NW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1225 feet.

Description	Depth in feet
Clay soil, sand	0 - 6.5
Granite	6.5 - 200

Line 121. NW. cor. NE 1/4 NW 1/4 sec. 2, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1259 feet.

Description	Depth in feet
Clay soil, sand	0 - 2.5
Clay, some sand and gravel	2.5 - 10
Granite	10 - 200
Granite is shallower to the west.	

Line 122. SE. cor. NW 1/4 NE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1191 feet.

Description	Depth in feet
Clay soil, sand	0 - 12
Granite	12 - 200

Line 123. SE. cor. SW 1/4 NE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1202 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 4.2
Clay	4.2 - 8.4
Sand, gravel	8.4 - 18
Granite	18 - 200

Line 124. 114 feet S. of NW. cor. SE 1/4 SE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1242 feet.

Description	Depth in feet
Clay soil, sand	0 - 2.3
Clay, sand	2.3 - 9.2
Gravel, sand	9.2 - 24
Clay	24 - 36
Granite	36 - 300

Line 125. SE. cor. SW 1/4 SE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1223 feet.

Description	Depth in feet
Clay soil, some sand	0 - 4.2
Clay	4.2 - 8.4
Clay, sand, gravel	8.4 - 68
Granite	68 - 400

Line 126. SW. cor. NW 1/4 NE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1201 feet.

Description	Depth in feet
Clay soil	0 - 11
Sand, gravel, clay	11 - 82
Granite	82 - 400

Line 127. 12 feet N. of 1/4, SW. cor. SW 1/4 NE 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1199 feet.

Description	Depth in feet
Clay soil, little gravel	0 - 9.5
Clay, sand, gravel	9.5 - 45
Granite	45 - 250

Line 128. 210 feet W. of 1/4 line, NE 1/4 SW 1/4 sec. 4, T 25 N., R. 3 E. P-1 N. 0° E. Altitude 1208 feet.

Description	Depth in feet
Clay soil, some sand	0 - 40
Granite	40 - 400

Line 129. 410 feet N. and 210 feet W. of 1/4 line, SE. cor. SE 1/4 SW 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1206 feet.

Description	Depth in feet
Clay soil, sandy clay	0 - 35
Clay, sand, gravel	35 - 47
Granite	47 - 300

Line 130. 23 feet E. and 300 feet S. of 1/4 line, SE 1/4 NW 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1207 feet.

Description	Depth in feet
Clay soil, granite boulders	0 - 31
Sand, gravel	31 - 42
Granite	42 - 200

Line 131. 468 feet W. of 1/4 line, SE. cor.SW 1/4 NW 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1206 feet.

Description	Depth in feet
Clay soil, sand	0 - 14
Clay	14 - 42
Granite	42 - 300

Line 132. SE. cor. SE 1/4 NE 1/4 sec. 5, T. 25 N., R. 3 E. P-1 N: 0° E. Altitude 1215 feet.

Description	Depth in feet
Clay soil, sand	0 -- 16
Clay	16 -- 22
Granite	22 -- 200

Line 133. SW. cor. SE 1/4 SW 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1223 feet.

Description	Depth in feet
Clay, sand, soil	0 -- 2.4
Clay	2.4 -- 10
Granite	10 -- 200

Line 134. NE cor. SE 1/4 NE 1/4 sec. 5, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1226 feet.

Description	Depth in feet
Clay, sand soil	0 -- 2.2
Clay	2.2 -- 8.8
Granite	8.8 -- 200

Line 135. 400 feet S. and 275 feet E. of 1/4 line, NW. cor. NE 1/4 NW 1/4 sec. 4, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1235 feet.

Description	Depth in feet
Clay soil, sand	0 -- 5
Clay	5 -- 20
Granite	20 -- 200

Line 136. 500 feet S. of N. line, NE. cor. NW 1/4 NE 1/4 sec. 5, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1266 feet.

Description	Depth in feet
Clay, sand soil	0 - 2.5
Clay	2.5 - 10
Sand, gravel, clay	10 - 46
Granite	46 - 300

Line 137. 150 feet E. of W. line, SW. cor. SW 1/4 NW 1/4 sec. 32, T. 26 N., R. 3 E. P-1 N. 0° E. Altitude 1300 feet.

Description	Depth in feet
Clay soil, sand	0 - 3.4
Sand, gravel	3.4 - 13.5
Clay, some sand and gravel	13.5 - 82
Granite	82 - 300

Line 138. NE. cor. NW 1/4 NW 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1269 feet.

Description	Depth in feet
Clay, sand soil	0 - 2.4
Clay	2.4 - 9.6
Sand, gravel, clay	9.6 - 46
Gravel	46 - 400

Line 139. NW. cor. NE 1/4 NE 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1268 feet.

Description	Depth in feet
Clay, sand soil	0 - 4.1
Clay	4.1 - 16.4
Granite	16.4 - 400

Line 140. 325 feet E. of W. line, NW. cor. SW 1/4 NW 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1249 feet.

Description	Depth in feet
Clay, boulders	0 - 2.8
Clay, some sand	2.8 - 11
Granite	11 - 400

Line 141. 0.1 mile N. of 1/2 line, SE. cor. SW 1/4 NW 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1250 feet.

Description	Depth in feet
Clay soil, some sand	0 - 5.5
Clay	5.5 - 11
Granite	11 - 200

Line 142. NE. cor. SE 1/4 NW 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1275 feet.

Description	Depth in feet
Clay soil	0 - 5.4
Sand, gravel	5.4 - 21
Sand, gravel, clay	21 - 50
Granite	50 - 400

Line 143. SE. cor. SW 1/4 NE 1/4 sec. 1, T. 25 N., R. 2 E. Two attempts made here but both were abandoned.

Line 144. 370 feet N. 20° W. of SE. cor. SW 1/4 NE 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 20° W. Altitude 1264 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.7
Clay	2.7 - 11
Sand, gravel, clay	11 - 38
Granite	38 - 200

Line 145. 678 feet N. of S. line, SE. cor. NE 1/4 SE 1/4 sec. 5, T. 25 N., R. 3 E. P-1 N. 85° E. Altitude 1221 feet.

Description	Depth in feet
Clay soil	0 - 9.5
Granite	9.5 - 300

Line 146. 25 feet E. of 1/4 line, SW. cor. NW 1/4 NE 1/4 sec. 9, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1230 feet.

Description	Depth in feet
Clay soil, sand	0 - 3.8
Clay	3.8 - 15
Granite	15 - 400

Line 147. SE. cor. NW 1/4 NE 1/4 sec. 9, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1230 feet.

Description	Depth in feet
Clay, sand	0 - 72
Granite	72 - 400

Curve very erratic, appears to have been taken near buried conductors.

Line 148. NE. cor. SE 1/4 NE 1/4 sec. 9, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1243 feet.

Description	Depth in feet
Clay soil	0 - 44
Granite	44 - 400

Line 149. SE. cor. NW 1/4 NW 1/4 sec. 10, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1282 feet.

Description	Depth in feet
Sandy clay soil	0 - 3.1
Clay	3.1 - 6.2
Clay, some sand or gravel	6.2 - 67
Granite	67 - 400

Deeper to bedrock on P-1 than on P-2.

Line 150: 150R. SE. cor. NE 1/4 NW 1/4 sec. 10, T. 25 N., R 3 E.
Three attempts made but was unable to get satisfactory readings.

Line 151. 0.15 mile W. and 0.08 mile S. of 1/4 line, NE. cor. SE 1/4 NE 1/4 sec. 10, T. 25 N., R. 3 E. P-1 N. 87° E. Altitude 1261 feet.

Description	Depth in feet
Sandy clay soil	0 - 2.3
Clay	2.3 - 10.5
Granite	10.5 - 200

Line 152. 950 feet E. of 1/2 sec. line, SW. cor. NW 1/4 NE 1/4 sec. 10, T. 25 N., R. 3 E. P-1 N. 90° E. Altitude 1253 feet.

Description	Depth in feet
Clay, sand soil	0 - 6
Clay	6 - 9
Granite	9 - 200

Line 153. 30 feet E. of 1/4 line, SW. cor. NE 1/4 NW 1/4 sec. 11, T. 25 N., R. 3 E. P-1 N. 0° E. Altitude 1220 feet.

Description	Depth in feet
Clay soil, sand and gravel	0 - 18
Granite	18 - 200

Line 154. NE. cor. SE 1/4 SE 1/4 sec. 2, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1248 feet.

Description	Depth in feet
Clay soil, sand and gravel	0 - 17
Clay, some sand and gravel	17 - 47
Granite	47 - 400

Line 155. NW. cor. NE 1/4 NW 1/4 sec. 12, T. 25 N., R. 2 E. P-1 N. 90° E. Altitude 1238 feet.

Description	Depth in feet
Clay soil, clay	0 - 3.1
Clay and gravel	3.1 - 12.5
Clay	12.5 - 29
Granite	29 - 300

Line 156. 50 feet W. of 1/4 line, SE. cor. NE 1/4 SW 1/4 sec. 1, T. 25 N., R. 2 E. P-1 N. 0° E. Altitude 1248 feet.

Description	Depth in feet
Clay soil, boulders, clay	0 - 11.5
Clay	11.5 - 23
Granite	23 - 300

Line 157. SE. cor. NE 1/4 NW 1/4 sec. 10, T. 25 N., R. 3 E.
Observations erratic, abandoned.

TEST WELL DRILLING REPORTS

From Marshfield, Wisconsin Electric and Water Department.

Sec. T. R. W.

1 - 25 - 2 - 1. Test made on the Joe Kohlbeck property.

Description	Depth in feet
Brown clay	1 - 16
Blue clay, stony	16 - 40
Brown clay	40 - 47
Granite	47 -

3 - 25 - 3 - 1. Test made on Henry Weigel property at the farm house.

Description	Depth in feet
Clay	1 - 16
Sand and gravel, dirty	16 - 17
Clean coarse sand	17 - 28
Coarse gravel	28 - 33
Sand and gravel, clean	33 - 39
Sand and gravel, trace of clay	39 - 40
Sand and gravel, fine	40 - 45
Coarse sand and gravel	45 - 55
Sand and gravel	55 - 57
Coarse gravel	57 - 60
Coarse sand and gravel	60 - 65
Coarse gravel	65 - 66
Granite	66 -

4 - 25 - 3 - 2. 20 feet S. of N. line fence, 10 feet E. of creek.

Description	Depth in feet
Black clay, stony	1 - 20
Black clay, soft	20 - 35
Granite	35 -

Static head 1 foot above ground.

4 - 25 - 3 - 3. 30 feet W. of creek, 125 feet S. of N. line fence.

Description	Depth in feet
Black clay	1 - 4
Blue clay, stony	4 - 42
Brown clay	42 - 45
Granite	45 -
Static head 10 feet.	

4 - 25 - 3 - 4. On the Ray Egger property, 30 feet E. of drainage ditch, 100 feet S. of N. line fence.

Description	Depth in feet
Brown clay	1 - 4
Hard pan	4 - 7
Sandy brown clay	7 - 23
Sandy blue clay	23 - 42
Black clay, stony	42 - 58
Sand, gravel, rock	58 - 61
Granite	61 -

4 - 25 - 3 - 5. On the Joe Burgraff property (old brickyard), 150 feet E. of pasture fence, 10 feet N. of small pond.

Description	Depth in feet
Brown clay	1 - 10
Brown clay and boulders	10 - 14
Blue clay	14 - 40
Brown clay	40 - 60.5
Gravel, trace	60.5 - 61
Granite	61 -

4 - 25 - 3 - 7. On the Joe Burgraff property, 24 feet S. of large elm tree then 75 feet on W. bank of creek.

Description	Depth in feet
Blue clay	1 - 9
Hard sand and boulders	9 - 13
Blue clay	13 - 20
Dirty sand	20 - 22
Sand, clean	22 - 26
Coarse gravel, clean	26 - 28
Coarse sand, clean	28 - 31
Blue and brown clay	31 - 56
Granite	56 -

4 - 25 - 3 - 9. On the Joe Burgraff property, 195 feet E. of pasture fence, thence 250 feet on S. side of creek.

Description	Depth in feet
Blue clay	1 - 6
Hard pan	6 - 11
Hard pan, boulders	11 - 14
Clay and gravel stones	14 - 24
Brown clay	24 - 37
Brown clay and gravel stones	37 - 48
Blue clay	48 - 62
Decomposed granite	62 - 65
Granite	65 -

4 - 25 - 3 - 10. On the Joe Burgraff property, 50 feet E. of N.-S. drainage ditch, 40 feet W. of N.-S. lane fence.

Description	Depth in feet
Black clay	1 - 4
Sandy blue clay	4 - 16
Dirty gravel and clay	16 - 24
Blue clay, sandy	24 - 40
Black clay	40 - 61
Granite	61 -

4 - 25 - 3 - 12. On the Ray Egger property, 30 feet W. of drainage ditch, 100 feet S. of N. line fence.

Description	Depth in feet
Brown clay	1 - 6
Brown clay and boulders	6 - 7
Brown and blue clay	7 - 30
Blue and black clay, stony	30 - 50
Black clay, soft and smooth	50 - 58
Very coarse sharp sand	58 - 60
Very coarse sand and gravel, clean	60 - 64
Coarse sand, clean	64 - 65
Brown clay	65 - 67
Hard sand rock	67 - 67.5
Granite	67.5 -

7 - 25 - 3 - 6. At W. end of Arlington Avenue, SE. fence corner:

Description	Depth in feet		
Clay, gravelly clay, stones, boulder 8 ft.	0	-	21
Layers of clay, gravel, sand, water	21	-	27
Sandy clay, water shuts, well dry	27	-	33
Clay, no caving	33	-	39
Coarse gravel in clay, water	39	-	41
Coarse gravel, large stones in clay, water	41	-	43
Coarse gravel, stones, fine sand, clay	43	-	45
Gray clay, water shuts	45	-	59
Blue-gray clay	59	-	61
Blue-gray clay, gravelly, water	61	-	69
Brown clay, gravel, sand, water	69	-	73
Blue granite	73	-	

12 - 25 - 2 - 1. On the Joe Whittington property.

Description	Depth in feet		
Black clay	1	-	4
Clay and gravel	4	-	15
Decomposed granite	15	-	16
Granite, very hard	16	-	19

12 - 25 - 2 - 2. On the Joe Whittington property.

Description	Depth in feet		
Black clay	1	-	4
Clay and gravel	4	-	16
Hard granite	16	-	19

15 - 25 - 3 - 1. On the Alba Bump property.

Description	Depth in feet
Brown and yellow clay	1 - 23.5
Hardpan	23.5 - 32
Sandy clay, silt or shale	32 - 43
Stony clay, shale	43 - 48
Shale, clay, silt	48 - 72
Shale, clay, silt, granite	72 - 74
Granite	74 -

16 - 25 - 3 - 1. SW. of Asylum, next to creek.

Description	Depth in feet
Clay	0 - 20
Sand and gravel	20 - 24
Soft rock	24 - 25
Hard rock	25 - 26

16 - 25 - 3 - 7. In field NW. of Asylum buildings.

Description	Depth in feet
Black dirt	0 - 1
Yellow clay	1 - 4
Sandy clay, blueish, caves	4 - 7
Yellow gravelly clay	7 - 10
Blue gravelly clay, silty	10 - 21
Silty blue sandy clay	21 - 36
Blue gravelly clay	36 - 40
Silt-like clay	40 - 41
Gravelly blue clay, water	41 - 50
Blue clay, sand and gravel at 55 feet	50 - 55
Gravel, stones, clay	55 - 56
Decomposed rock, ending on granite	56 - 58

16 - 25 - 3 - 10. On W. line fence of county farm, on bank of creek coming from towards the Asylum.

Description	Depth in feet
Black dirt	0 - 2
Brown gravelly clay	2 - 5
Brown gravelly, stony clay, layer stones	5 - 10
Red sand-rock clay	10 - 12
Sand rock and sand rock clay	12 - 18
Granite clay	18 - 20
Granite	20 -

28 - 26 - 3 - 1. On the Frey farm SW 1/4 SW 1/4 NE 1/4 sec. 28.

Description	Depth in feet
Yellow clay	1 - 3
Stony hardpan	3 - 8
Brown gravelly clay	8 - 25
Red-brown stony clay	25 - 32
Sandy gravelly clay	32 - 39
Clay and gravel	39 - 46
Brown tough clay	46 - 71
Granite clay	71 - 72
Bedrock	72 -
Water 32 1/2 feet	

28 - 26 - 3 - 2. 1155 feet W. and 495 feet N. of center sec. 28.

Description	Depth in feet
Brown top soil	0 - 2
Gray dirt, layer stones	2 - 4
Brown sandy clay	4 - 8
Brown stony clay, sandy	8 - 29
Stony clay, gravel, water	29 - 43
Gravelly sandy clay, water	43 - 49.5
Dirty sand and gravel	49.5 - 51
Sandy clay and gravel	51 - 55.5
Decomposed granite, ending bedrock	55.5 - 61
Water level 50 feet below ground level.	

28 - 26 - 3 - 4. NW 1/4 SW 1/4 SE 1/4 sec. 28, 250 feet E. of NW. cor. on the Hardinger farm.

Description	Depth in feet
Yellow dirt	0 - 2
Hardpan, stony	2 - 10
Stony, gravelly clay	10 - 23
Clay, gravel, sand	23 - 27
Gravel, sand, silt	27 - 34
Fine dirty sand	34 - 35
A little coarser, no water	35 - 39
Granite clay ending on bedrock	39 - 41
Water level 17 feet.	

28 - 26 - 3 - 5. NW 1/4 SW 1/4 SE 1/4 sec. 28, 750 feet E. of NW cor. on the Hardinger farm.

Description	Depth in feet
Yellow dirt	0 - 2
Hardpan streak, stony clay	2 - 8
Reddish brown gravelly clay	8 - 19
Coarse sand and gravel, dirty	19 - 24
Coarse gravel, very dirty	24 - 29
Sand and gravel, silt, fines, water	29 - 34
Black clay, rubbery, oil streaks	34 - 42
Bedrock	42 - 43
Water level 13 feet.	

30 - 26 - 3 - 3. On John E. Adler property, 40 feet W. of fence on town road, 36 rods S. of N. line fence.

Description	Depth in feet
Yellow clay	1 - 20
Blue clay	20 - 28
Granite	28 - 28.5

33 - 26 - 3 - 2. 85 feet W. of E. property line and 350 feet S. of N. property line.

Description	Depth in feet
Stony clay	1 - 4
Sandy blue clay	4 - 32
Granite	32 -

33 - 26 - 3 - 3. 375 feet W. of E. property line and 80 feet S. of N. property line.

Description	Depth in feet
Brown clay	1 - 4
Gravel and hardpan	4 - 9
Sand, gravel, clay	9 - 10
Sand, some clay	10 - 12
Blue clay, stony	12 - 28
Brown clay, stony	12 - 43
Granite	43 -

33 - 26 - 3 - 4. Art Scheuer property, 91 feet S. of stone driveway on E. bank of creek.

Description	Depth in feet
Yellow clay	1 - 4
Hardpan	4 - 7
Yellow clay, stony	7 - 9
Hardpan, boulders	9 - 16
Coarse gravel, dirty	16 - 18
Fine sand	18 - 21
Coarse gravel and sand	21 - 24
Coarse gravel	24 - 28
Coarse sand and gravel	28 - 30
Coarse gravel, dirty	30 - 32
Decomposed granite	32 - 34
Granite	34 -

33 - 26 - 3 - 5. 552 feet S. of N. property line, 170 feet E. of W. property line.

Description	Depth in feet		
Sandy clay	1	-	3
Gravel, brown clay	3	-	10
Gravelly yellow clay	10	-	15
Dirt, sand, gravel, water	15	-	30
Yellow clay and gravel	30	-	33
Blue clay	33	-	36
Sand rock, soft	36	-	39
Sand rock, hard	39	-	

33 - 26 - 3 - 6. Art Scheuer property, 33 feet W. of E. property line, 5 feet S. of N. property line.

Description	Depth in feet		
Brown clay	1	-	5
Stony red clay	5	-	12
Stony blue clay	12	-	53
Granite	53	-	

33 - 26 - 3 - 7. Ed. Hardinger property, 80 feet N. of S. line, 14 feet E. of creek.

Description	Depth in feet		
Blue clay	1	-	4
Hardpan	4	-	14
Coarse sand and gravel	14	-	18
Fine sand and gravel	18	-	21
Blue clay	21	-	48
Black clay, sandy	48	-	55
Granite	55	-	

Scheuer Well 500 GPM

33 - 26 - 3 - 16. Art Scheuer property, 15 feet S. of N. line and 10 feet E. of creek.

Description	Depth in feet
Black clay	0 - 3
Hardpan	3 - 7
Gravel and clay, boulders	7 - 10
Fine sand	10 - 12
Coarse gravel, clean	12 - 21
Red gravel	21 - 25
Coarse gravel	25 - 30
Coarse sand and gravel	30 - 34
Coarse gravel	34 - 50
Sand and gravel	50 - 54
Granite	54 - 54.5

33 - 26 - 3 - 17. SE 1/4 sec. 33, 15 feet W. of pine tree on Sebastian farm.

Description	Depth in feet
Top soil	0 - 1
Hardpan	1 - 23
Sand, gravel, dirty	23 - 33
Coarse brown sand, gravel, clean	33 - 41
Coarse sand and gravel	41 - 42
Coarse brown sand	42 - 43
Coarse sand, dirty	43 - 44
Coarse sand and gravel, clean	44 - 45
Fine sand and clay	45 - 47
Decomposed granite	47 - 48.5
Granite	48.5 - 49

34 - 26 - 3 - 1. SE 1/4 NW 1/4 SW 1/4 SW 1/4 sec. 34 John Sebastian property/ 0.2 mile N. of SW. cor. of section.

Description	Depth in feet
Top soil	0 - 1
Brown clay	1 - 4
Hard pan, some gravel	4 - 14
Sand, gravel	14 - 17
Fine sand	17 - 19