Appendix B

Boring Logs and Well Construction Details

Engineering & Environmental Solutions, LLC

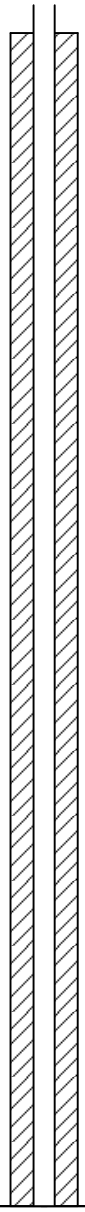
400 136th Avenue
Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
www.goEESolutions.com

Log of Borehole: DB-24

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 656.46
Top of Casing Elevation (feet): 658.85
Logged By: Kurt Van Appledorn
Comments: 2.4' Stick-up

Start Date: 10-29-15
End Date: 11-3-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 152
Easting: 5100.42
Northing: 4452.04

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
		Ground Surface	656.5					
0		0-20' Brown (10YR5/3) silty CLAY, Mottles 5% Gray (10YR6/1)	0.0					
1								
2								
3								
4								
5				2.0	1.8	3 4 5 6		
6								
7								
8								
9								
10				2.0	2.0	2 9 11 16		
11								
12								
13								
14								
15				2.0	2.0	4 11 11 13		
16								
17								
18								
19								
20			636.5 20.0					



Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24
Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20		20-115.5' Dark grayish brown (10YR4/2) silty CLAY, ftrace fine gravel and nodules, slightly moist.						
21				2.0		Shelby		
22								
23				2.0		Shelby		
24								
25				2.0	2.0	2 4 7 10		
26								
27								
28								
29								
30				2.0	2.0	1 2 4 5		
31								
32								
33								
34								
35				2.0	2.0	2 5 7 8		
36								
37								
38								
39								
40								
41				2.0		Shelby		
42								
43				2.0		Shelby		
44								
45				2.0	1.7	3 4 5 5		

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Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24
Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
45						5 5		
46								
47								
48								
49								
50				2.0	2.0	2 2 4 4		
51								
52								
53								
54								
55				2.0	2.0	3 6 7 8		
56								
57								
58								
59								
60				2.0	2.0	1 3 5 8		
61								
62								
63								
64								
65				2.0	1.8	2 7 8 8		
66								
67								
68								
69								
70				2.0	2.0	3 5 8 9		

Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24
Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
70						8 9		
71								
72								
73								
74								
75				2.0	2.0	3 6 8 11		
76								
77								
78								
79								
80				2.0	2.0	3 3 7 11		
81								
82								
83								
84								
85				SS	2.0	3 4 7 7		
86								
87								
88								
89								
90				2.0	2.0	3 6 12 14	CL	
91								
92								
93								
94								
95				2.0	2.0	3 4 6 7		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24
Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
95						6 7		
96								
97								
98								
99								
100								
101				2.0	2.0	3 5 7 7		
102								
103				2.0	2.0	3 6 12 14		
104								
105				2.0	2.0	5 9 15 16		
106								
107				2.0	2.0	3 5 10 11		
108								
109				2.0	2.0	2 7 12 15		
110								
111				2.0	1.7	6 9 10 12		
112								
113				2.0	2.0	4 8 11 12		
114								
115				2.0	2.0	5 12 18 19		
116		115.5-116' Grayish brown (10YR5/2) clayey fine SAND, trace meduim and coarse sand, very moist.	541.0 115.5					
117		116-140.8' Dark grayish brown (10YR4/2) silty fine SAND, wet.		2.0	2.0	10 21 24 26		
118								
119		Seams of grayish brown (10YR5/2) silty fine sand, few medium sand, trace coarse sand, wet at 126.7-127.2' and 128-129'.		2.0	0.2	5 31 50-5"		
120								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24
Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
120								
121				2.0	2.0	7 15 23 41		
122								
123				2.0	1.6	5 17 25 37		
124								
125				2.0	2.0	14 23 34 47		
126								
127				2.0	1.6	7 33 36 49		
128								
129				2.0	2.0	4 10 18 26		
130								
131				2.0	2.0	5 17 30 37		
132								
133				2.0	2.0	6 47 37 50-5"		
134								
135				2.0	2.0	5 22 35 50-4"		Bentonite Grout
136								
137				2.0	2.0	9 20 21 24		
138								
139				2.0	2.0	3 12 19 20		
140								
141		140.8-142' Grayish brown (10YR5/2) clayey SILT, moist	515.7 140.8	2.0	1.2	4 31 50-3"		
142		142-150' Grayish brown (10YR5/2) silty CLAY, trace fine sand to fine gravel, occassional thin to 0.5" clayey sand seams between 142.7' and 146', moist.	514.5 142.0					
143				2.0	2.0	7 30 31 42		
144								
145				2.0	2.0	11 47 50-3"		

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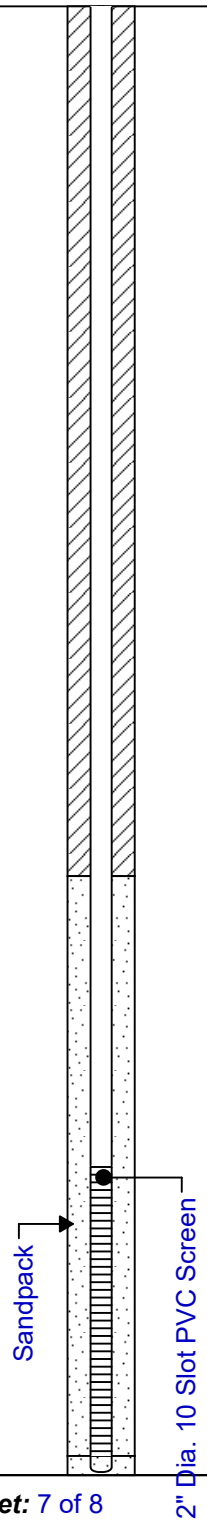
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24

Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
145						50-3"		
146								
147				2.0	0.6	75-6"		
148								
149				2.0	1.0	31 50-5"		
150			506.5					
151		150-152' Grayish brown (10YR5/2) sandy CLAY, few coarse gravel, moist.	150.0	2,0	0.4	75-6"		
152			504.5 152.0					
153		152-177' Grayish brown (10YR5/2) clayey fine SAND, occassional lenses of medium sand to coarse gravel, becomes silty fine sand below 162', wet.		2.0	0.2	7 27 36 47		
154								
155				2.0	0.9	12 50-5"	SW-SC	
156								
157				2.0	0.8	13 35 50-5"		
158								
159				2.0	1.0	17 28 38 21	SW-SC	
160								
161				2.0	0.1	10 18 24 25		
162								
163				2.0	0.9	8 20 25 25		
164								
165				2.0	1.0	5 13 22 23	SW-SC	
166								
167				2.0	0.8	12 21 27 26		
168								
169				2.0	1.1	10 37 35 35		
170								



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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-24

Start Date: 10-29-15
End Date: 11-3-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
170								
171				2.0	1.1	10 22 21 23		
172								
173				2.0	1.3	16 16 17 18		
174								
175				2.0	0.8	5 14 16 50-4"		
176								
177		177-180' GRAVEL and COBBLES, wet.	479.5 177.0	2.0	0.6	19 75-3"		
178								
179				2.0	0.1	75-3"		
180		180-184' LIMESTONE	476.5 180.0					
181				2.0	0.1	75-5"		
182								
183				2.0	0.3	75-3"		
184		End of Boring	472.5 184.0					
185								
186								
187								
188								
189								
190								
191								
192								
193								
194								
195								

Engineering & Environmental Solutions, LLC

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Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
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Log of Borehole: DB-25

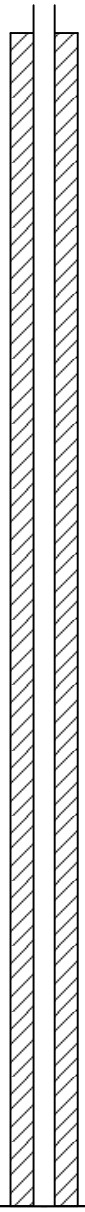
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 651.05
Top of Casing Elevation (feet): 653.30
Logged By: Kurt Van Appledorn
Comments: 2.3' Stick-up

Start Date: 11-4-15
End Date: 11-9-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 147.6
Easting: 6159.73
Northing: 4461.97

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol
		Ground Surface	651.1				
0		0-17' Dark grayish brown (10YR4/2) silty CLAY, slightly moist. Mottles 5 - 10% Gray (10YR6/1) 5 - 10% Bronwish yellow (10YR6/6)	0.0				
1							
2							
3							
4							
5				2.0	1.5	3 5 7 7	
6							
7							
8							
9							
10				2.0	1.7	3 8 12 15	
11							
12							
13							
14							
15				2.0	1.9	3 6 10 10	
16							
17		17-100' Dark grayish brown (10YR4/2) silty CLAY, ftrace coarse sand and nodules, slightly moist.	634.1 17.0				
18							
19							
20				2.0	2.0	3 5 8 8	

Well Completion Details



Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25

Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20						8 8		
21								
22								
23								
24								
25				2.0	2.0	3 3 5 7		
26								
27								
28								
29								
30				2.0	0.1	2 4 6 7		
31								
32								
33								
34								
35				2.0	2.0	2 3 4 4		
36								
37								
38								
39								
40				2.0	2.0	2 3 5 8		
41								
42								
43								
44								
45				2.0	2.0	3 6 11 12		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25
Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
45						11 12		
46								
47								
48								
49								
50				2.0	2.0	3 5 13 15		
51								
52								
53								
54								
55				2.0	2.0	3 8 11 13		
56								
57								
58								
59								
60				2.0	2.0	7 8 13 13		
61								
62								
63								
64								
65				2.0	2.0	- 8 9 12		
66								
67								
68								
69								
70				2.0	0	Crushed Shelby		

Engineering & Environmental Solutions, LLC
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25
Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
70						Shelby		
71								
72				2.0	0	Crushed Shelby		
73								
74				2.0	2.0	9 24 49 50-4"		
75								
76				2.0	1.5	Shelby		
77								
78				2.0	1.0	Shleby		
79								
80				2.0	2.0	8 9 13 14		
81								
82								
83								
84								
85				SS	2.0	4 8 11 12	CL	
86								
87								
88								
89								
90				2.0	2.0	6 13 12 20		
91								
92								
93								
94								
95				2.0	2.0	6 9 10 18		

Engineering & Environmental Solutions, LLC
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25
Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
95						10 18		
96								
97								
98								
99								
100			551.0					
		100-123' Dark grayish brown (10YR4/2) silty CLAY, few fine sand to fine gravel, trace coarse gravel. Occassional wet silty clay, sand, sandy clay, or sandy silt seam (<0.5').	100.0					
101				2.0	1.9	13 21 37 50-4"		
102								
103		Mottles below 19' were 5% Dark yellowish brown (10YR4/6) and 10% Gray (10YR6/1)		2.0	2.0	13 22 34 39		
104								
105				2.0	2.0	7 13 26 33		
106								
107				2.0	2.0	5 12 12 17		
108								
109				2.0	1.4	2 6 27 47		
110								
111				2.0	0.9	21 50-4"		
112								
113				2.0	0.1	75-2"		
114								
115				2.0	2.0	9 15 31 30		
116								
117				2.0	1.1	13 35 50-3"		
118								
119				2.0	1.0	21 50-5"		
120								

Engineering & Environmental Solutions, LLC
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25
Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
120								
121				2.0	1.2	32 48 50-3"		
122								
123		123-124' Dark grayish brown (10YR4/2) silty fine SAND, wet.	528.0 / 123.0 / 527.0	2.0	1.5	24 36 50-5"		
124		124-124.8' Dark grayish brown (10YR4/2) clayey, sandy, SILT, wet	124.0 / 526.3 / 124.8					
125		124.5-138' Dark grayish brown (10YR4/2) very silty CLAY, trace fine to coarse gravel, moist.		2.0	1.0	15 45 50-3"		
126								
127				2.0	1.5	17 23 42 50-2"		
128								
129				2.0	0	12 41 50-2"		
130								Bentonite Grout
131				2.0	1.0	24 50-5"		
132								
133				2.0	1.2	8 27 50-3"		
134								
135				2.0	0.5	75-6"		
136								
137				2.0	2.0	10 37 39 40		
138		138-147.6' Dark grayish brown (10YR4/2) silty CLAY, moist.	513.0 / 138.0					
139				2.0	1.5	25 27 50-5"		
140								
141				2.0	2.0	9 17 29 31		
142								
143				2.0	2.0	6 13 26 53		
144								
145				2.0	1.5	6 13 33 50-1"		

Engineering & Environmental Solutions, LLC
Holland, Michigan
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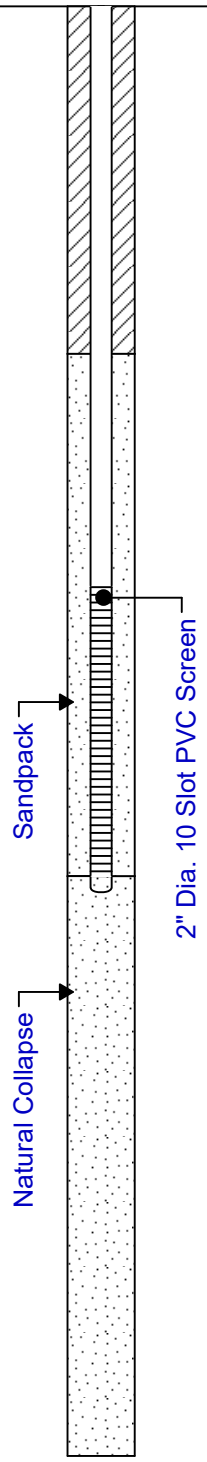
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-25

Start Date: 11-4-15
End Date: 11-9-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
145						33 50-1"		
146								
147			503.4	2.0	2.0	13 16 41 54		
148		147.6-166' Grayish brown (10YR5/2) silty fine SAND, few medium sand, trace coarse sand and fine gravel, wet. Occassional seams of coarse sand and fine gravel.	147.6					
149				2.0	1.0	14 26 50-2"	SW-SM	
150								
151				2,0	0.5	47 50-2"		
152								
153				2.0	1.0	13 45 50-3"		
154								
155				2.0	0.6	43 50-3"	SW-SM	
156								
157				2.0	1.1	7 31 50"		
158								
159				2.0	0.8	17 70-5"		
160								
161				2.0	0.9	16 50-5"	SW-SM	
162								
163				2.0	1.3	8 41 50-4"		
164								
165				2.0	1.0	25 50-5"		
166			485.0					
167		166-170' Clayey coarse GRAVEL and COBBLES, some fine to coarse sand, wet.	166.0	2.0	0.1	27 50-3"		
168								
169				2.0	1.0	24 75		
170			481.0					
			170.0					



Engineering & Environmental Solutions, LLC

400 136th Avenue
Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
www.goEESolutions.com

Log of Borehole: DB-26

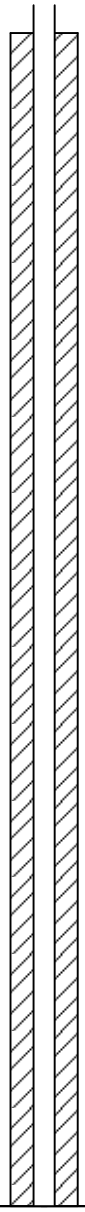
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 654.73
Top of Casing Elevation (feet): 657.65
Logged By: Kurt Van Appledorn
Comments: 3.0' Stick-up

Start Date: 11-10-15
End Date: 11-13-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 80.2
Easting: 6221.31
Northing: 5251.42

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol
		Ground Surface	654.7				
0		0-7' Reddish brown (5YR5/3) sandy CLAY, slightly moist. Mottles 10% Dark grayish brown (10YR4/2)	0.0				
1							
2							
3							
4							
5				2.0	1.3	2 3 3 4	
6							
7		7-14' Dark grayish brown (10YR4/2) silty CLAY, occassional 0.4' seams of very pale brown (10YR7/3) fine sand.	647.7 7.0				
8							
9							
10				2.0	1.6	2 3 4 4	
11							
12							
13							
14		14-14.3" Black (10YR2/1) ORGNICS	640.7 14.0				
15		14.3-17' Dark gray (10YR4/1) silty CLAY, some organics. Mottles: 20% Yellowish brown (YR5/6) 20% Gray (10YR5/1)		2.0	0.9	2 3 7 8	
16							
17		17-20' Brownish yellow (10YR6/6), 20% gray (10YR5/1), silty CLAY	637.7 17.0				
18							
19							
20			634.7 20.0	2.0	2.0	2 8 11 10	

Well Completion Details



Engineering & Environmental Solutions, LLC
Holland, Michigan
www.goEESolutions.com

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26

Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20		20-23' Reddish brown (5YR5/4) sandy CLAY.				11 10		
21								
22								
23		23-80.2' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and fine gravel and black nodules, moist.	631.7 23.0					
24								
25				2.0	1.2	13 15 16 13		
26								
27								
28								
29								
30				2.0	2.0	3 6 10 11		
31								
32								
33								
34								
35				2.0	2.0	3 9 9 10		
36								
37								
38								
39								
40				2.0	2.0	4 5 8 9		
41								
42				2.0		Shelby		
43								
44				SS		Shelby		
45								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26
Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
45								
46								
47								
48								
49								
50				2.0	2.0	3 4 4 6		
51								
52								
53								
54								
55				2.0	2.0	1 9 12 15		
56								
57								
58								
59								
60				2.0	2.0	5 11 19 20		
61								
62								
63								
64								
65				2.0	1.6	4 8 19 26		
66								
67								
68								
69								
70				2.0	2.0	5 8 13 12		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26
Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
70						13 12		
71								
72								
73								
74								
75				2.0	2.0	6 13 17 22		
76								
77								
78								
79								
80			574.5	2.0	2.0	7 16 22 18		
81		80.2-84' Dark grayish brown (10YR4/2) coarse SAND, wet.	80.2					
82								
83								
84			570.7					
85		84-86' Dark grayish brown (10YR4/2) fine SAND, wet.	84.0	SS	1.7	3 9 17 18		
86			568.7					
87		86-88.2' Coarse SAND with clay seam at 86.5-86.7'.	86.0	2.0	1.8	3 10 12 14		
88			566.5					
89		88.2-89' Dark grayish brown (10YR4/2) silty CLAY.	88.2 565.7	2.0	1.9	4 8 24 26		
90		89-90.7' Fine SAND.	89.0					
91		90.7-92.7' Dark grayish brown (10YR4/2) silty CLAY.	564.0 90.7	2.0	2.0	10 12 17 16		
92			562.0					
93		92.7-93.1' Fine SAND.	92.7	2.0	2.0	3 7 17 17		
94		93.1-122' Dark grayish brown (10YR4/2) silty CLAY, trace fine gravel below 112', moist						
95				2.0	1.3	3 14 33 35		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26
Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
95						33 35		
96								
97				2.0	2.0	4 18 28 26		
98								
99				2.0	2.0	5 11 23 27		
100								
101				2.0	1.6	8 19 25 25		
102								
103				2.0	1.7	10 18 28 29		
104								
105				2.0	1.5	9 13 19 21	SC	
106								
107				2.0	2.0	4 7 9 9		
108								
109				2.0	1.8	7 23 26 28		
110								
111				2.0	1.3	17 35 50-5"		
112								
113				2.0	2.0	7 13 23 24		
114								
115				2.0	2.0	6 11 17 25		
116								
117				2.0	2.0	9 35 50-6"		
118								
119				2.0	1.5	6 12 25 27		
120								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

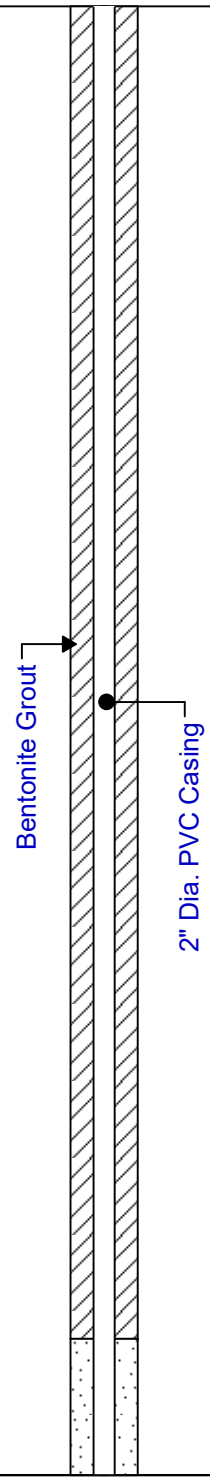
Log of Borehole: DB-26

Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol
120–121				2.0	2.0	6 10 10 11	
122			532.7				
122–123		122-123.6' Dark grayish brown (10YR4/2) sandy CLAY, moist.	122.0	2.0	2.0	21 33 48 50	
123			531.1				
124		123.6-124' Dark grayish brown clayey fine SAND, moist.	123.6				
125		124-129' Dark grayish brown sandy CLAY, trace fine gravel, very moist with 0.5" to 3" seams of wet clayey fine sand.		2.0	1.5	11 26 27 27	
126–127				2.0	1.9	112 28 36 45	
128–129			525.7	2.0	1.6	18 35 45 41	
129		129-132' Dark grayish brown (10YR4/2) sandy SILT, some clay, very moist.	129.0				
130–131				2.0	1.0	10 39 50-5"	
132			522.7				
132–133		132-134' Clayey SILT, moist, with 0.3' sandy CLAY, 0.2' wet silty fine SAND.	132.0	2.0	1.3	12 32 38 50	
134			520.7				
134–135		134-136' Dark grayish brown (10YR4/2) very silty CLAY, trace coarse sand, moist.	134.0	2.0	1.0	6 17 42 50-5"	
136			518.7				
136–137		136-138' Dark grayish brown (10YR4/2) clayey SILT, moist.	136.0	2.0	1.2	122 41 50-4"	
138			516.7				
138–139		138-142.3' Dark grayish brown (10YR4/2) silty CLAY, trace fine sand and fine gravel.	138.0	2.0	1.0	20 50-3"	
140–141				2,0	1.2	1 1 1 50	
142			512.4				
142–143		142.3-169.5' Grayish brown (10YR5/2) silty fine SAND, wet. Becomes less silty with lenses of coarse sand to coarse gravel.	142.3	2.0	1.0	1 10 50-5"	
144–145				2.0	0.5	14 41 50-2"	

Well Completion Details



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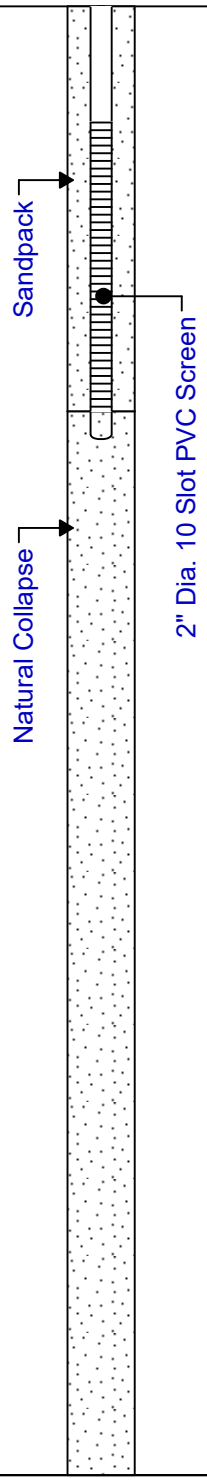
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26
Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
145						50-2"		
146								
147				2.0	0	16 50-3"		
148								
149				2.0	0.1	9 38 50-3"		
150								
151				2.0	0.5	31 50-2"	SW-SM	
152								
153				2.0	0	32 50-1"		
154								
155				2.0	0.5	32 75-2"	SW-SM	
156								
157				2.0	0	10 50-3"		
158								
159				2.0	0.9	9 50-5"	SW-SM	
160								
161				2.0	0.3	8 26 50-5"		
162								
163				2.0	0	4 21 50-5"		
164								
165				2.0	0	5 38 50-3"		
166								
167				2.0	0.3	5 38 50-3"	SW-SM	
168								
169				2.0	1.0	4 11 50-6"		
			485.2					
170			169.5					



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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-26
Start Date: 11-10-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
170		169.5-180.5 Silty CLAY with gravel. Fine sand seams at 172-173' and 178-178.5'						
171				2.0	1.5	16 38 50-5"		
172								
173				2.0	1.6	12 21 22 25		
174								
175				2.0	1.5	24 50-4"		
176								
177				2.0	1.5	5 10 50-6"		
178								
179				2.0	0.8	9 50-3"		
180			474.2					
181		180.5-181' SHALE	180.5	2.0	0.6	7 50-4"		
		End of Boring						
182								
183								
184								
185								
186								
187								
188								
189								
190								
191								
192								
193								
194								
195								

Engineering & Environmental Solutions, LLC

400 136th Avenue
Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
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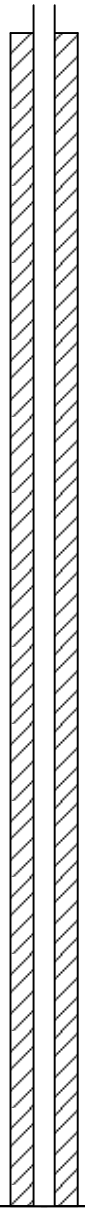
Log of Borehole: DB-27

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA/41/8" OD Rotary
Sampling Method: 2' Split Spoon/5' Split Core
Ground Elevation (feet): 657.47
Top of Casing Elevation (feet): 661.00
Logged By: Kurt Van Appledorn
Comments: Soil description from DB-28 log and samples

Start Date: 10-27-15
End Date: 10-28-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 67
Easting: 5877.31
Northing: 6508.72

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	657.5					
0		0-9.9' Brown (10YR5/3) silty CLAY, trace coarse sand and nodules, slightly moist. Mottles <5% Gray (10YR6/1) <5% Yellowish brown (10YR5/6)	0.0					
1								
2								
3								
4								
5								
6								
7								
8								
9								
			647.6					
10		9.9-12' Dark grayish brown (10YR4/2) silty CLAY, few fine gravel and brick pieces, trace coarse sand, slightly moist.	9.9					
11								
			645.5					
12		12-27' Brown (10YR5/3) silty CLAY, trace coarse sand and fine gravel. 10% Strong brown (7.5YR4/6)	12.0					
13								
14								
15		Mottles below 19' were 5% Dark yellowish brown (10YR4/6) and 10% Gray (10YR6/1)						
16								
17								
18								
19								
20								



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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-27
Start Date: 10-27-15
End Date: 10-28-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20								
21				2.0		Shelby		
22								
23				2.0		Shelby		
24								
25								
26								
27		27-69.5' Grayish brown (10YR5/2) silty CLAY, trace coarse sand and nodules, slightly moist to moist.	630.5 27.0					
28								
29								
30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41				2.0		Shelby		
42								
43				2.0		Shelby		
44								
45								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-27

Start Date: 10-27-15
End Date: 10-28-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
45								
46								
47								
48								
49								
50								
51								
52								
53								
54								
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65				2.0	0.8	24 50-3"		
66								
67				2.0	0	75		
68								
69				2.0	2.0	11 12 42 53		
			588.0 69.5					
70								

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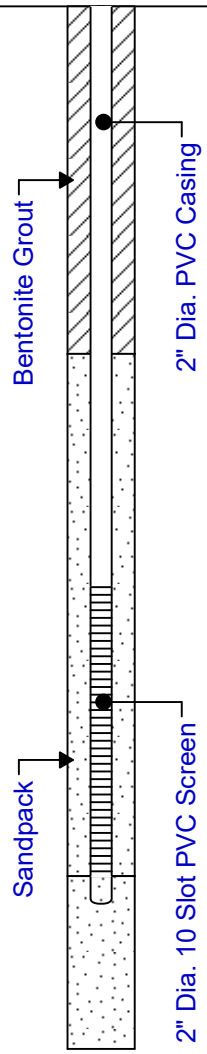
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-27

Start Date: 10-27-15
End Date: 10-28-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
70		69.5-80' Dark grayish brown (10YR4/2) sitly fine SAND, trace coarse sand at 71', wet.						
71				2.0	1.7	7 19 48 50-3"		
72								
73				2.0	1.2	18 48 50-4"		
74								
75				2.0	1.2	34 46 50-4"		
76								
77				2.0	1.0	8 32 50-5"		
78								
79				2.0	0.5	46 50-4"		
80			577.5					
81		80-87' Dark grayish brown silty fine SAND, few coarse sand to fine gravel, trace coarse gravel, wet	80.0	2.0	0.8	31 32 50-5"	SW-SM	
82								
83				2.0	0.5	5 5 7 16	SW-SM	
84								
85				2.0	0	75		
86								
87			570.5	2.0	1.8	41 49 50-3"	SW-SM	
		87-88' Silty CLAY, few coarse sand to fine gravel.	87.0					
88		End of Boring	569.5 88.0					
89								
90								
91								
92								
93								
94								
95								



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Phone/Fax: (616) 994-6541
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Log of Borehole: DB-28

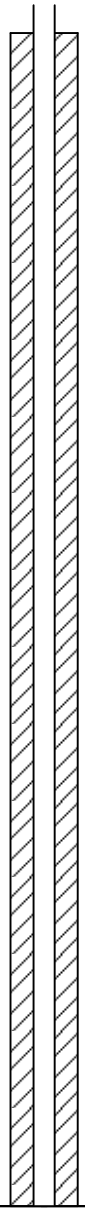
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA/41/8" OD Rotary
Sampling Method: 2' Split Spoon/5' Split Core
Ground Elevation (feet): 657.43
Top of Casing Elevation (feet): 660.85
Logged By: Kurt Van Appledorn
Comments: 3.4' Stick-up well for future 658' ground elevation.

Start Date: 10-15-15
End Date: 10-27-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 67
Easting: 5871.99
Northing: 6510.93

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol
		Ground Surface	657.4				
0		0-9.9' Brown (10YR5/3) silty CLAY, trace coarse sand and nodules, slightly moist. Mottles <5% Gray (10YR6/1) <5% Yellowish brown (10YR5/6)	0.0				
1							
2							
3							
4							
5				2.0	1.3	2 3 6 7	
6							
7							
8							
9							
10		9.9-12' Dark grayish brown (10YR4/2) silty CLAY, few fine gravel and brick pieces, trace coarse sand, slightly moist.	647.5 9.9	2.0	1.4	2 6 8 10	
11							
12		12-27' Brown (10YR5/3) silty CLAY, trace coarse sand and fine gravel. 10% Strong brown (7.5YR4/6)	645.4 12.0				
13							
14							
15		Mottles below 19' were 5% Dark yellowish brown (10YR4/6) and 10% Gray (10YR6/1)		2.0	1.6	2 4 8 9	
16							
17							
18							
19							
20				2.0	1.8	2 7 14 16	

Well Completion Details



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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20						14 16		
21								
22								
23								
24								
25				2.0	1.8	6 6 7 11		
26								
27		27-65.2' Grayish brown (10YR5/2) silty CLAY, trace coarse sand and nodules, slightly moist to moist.	630.4 27.0					
28								
29								
30				2.0	2.0	2 4 7 7		
31								
32								
33								
34								
35				2.0	2.0	1 3 3 5		
36								
37								
38								
39								
40				2.0	2.0	1 2 3 4		
41								
42								
43								
44								
45				2.0	2.0	2 4 5 9		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
45						5 9		
46								
47								
48								
49								
50				2.0	2.0	2 3 2 3		
51								
52								
53								
54								
55				2.0	2.0	3 8 9 10		
56								
57								
58								
59								
60				2.0	2.0	4 10 13 19		
61								
62								
63								
64								
65			592.2	2.0	2.0	23 19 32 30		
66		65.2-65.9' Grayish brown (10YR5/2) clayey, sitly, fine SAND, wet 65.9-67' Grayish brown (10YR5/2) silty CLAY, trace coarse sand and nodules, slightly moist to moist.	65.2					
67			590.4 67.0					
68		67-78' Light brownish gray (10YR6/2) silty fine SAND, wet.						
69								
70				2.0	1.6	1 1 19 25		

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Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
70						19 25		
71								
72								
73								
74								
75				2.0	1.5	2 3 5 5		
76								
77								
78		78-89' Grayish brown (10YR5/2) silty fine SAND to coarse GRAVEL, wet.	579.4 78.0					
79								
80				2.0	1.0	8 21 46 50-5"		
81								
82								
83								
84								
85				2.0	0.3	42 43 31 28		
86								
87								
88								
89		89-92' Grayish brown sandy SILT, wet.	568.4 89.0					
90				2.0	0.8	19 49 50-3"		
91								
92		92-99' Grayish brown (10YR5/2) silty fine SAND, wet, sandy silty at 95.0-95.2'	565.4 92.0					
93								
94								
95				2.0	1.7	7 25 44 50-3"		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
95						44 50-3"		
96								
97								
98								
99			558.4					
		99-103' Grayish brown sandy SILT, wet.	99.0					
100				2.0	0.7	9 39 50-3"		
101								
102				2.0	0	11 54 50-2"		
103			554.4					
		103-113.5' Brown (10YR5/3) fine SAND, wet. Silty fine sand from 103' to 105' with 2" sandy silty seam at 106' and 3" silt seam at 107'.	103.0					
104				2.0	1.3	5 19 50-3"		
105		Trace medium sand from 107' to 112'						
106		Trace coarse sand from 109' to 112'		2.0	1.5	5 18 55-6"		
107		Some coarse sand from 112' to 113.5'						
108				2.0	0.9	5 17 50-5"		
109								
110				2.0	0.9	9 30 50-3"		
111								
112				2.0	1.2	6 21 22 14		
113			543.9					
		113.5-116' Brown silty CLAY, trace coarse sand to coarse gravel, siltier below 115', moist.	113.5					
114				2.0	1.9	5 11 33 50-5"		
115								
116			541.4	2.0	0.9	12 22 50-5"		
		116-119' Grayish brown (2.5Y5/2) alternating ~ 3" layers of fine sand and silt.	116.0					
117								
118				2.0	1.1	5 12 42-5"		
			538.4					
119		119-121' Grayish brown (2.5Y5/2) silty fine SAND, wet.	119.0					
120				2.0	0.9	5 11 39 50-3"		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28

Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
120			536.4			39 50-3"		
121		121-123' Grayish brown (10YR5/2) silty CLAY, trace coarse sand to coarse gravel.	121.0	2.0	0.9	18 45 50-2"		
122			534.4					
123		123-125' Grayish brown (10YR5/2) silty CLAY, some fine sand, few coarse sand to coarse gravel, very moist to wet.	123.0	2.0	0.7	41 50-4"		
124			532.4					
125		125-127' Grayish brown (10YR5/2) clayey fine SAND, trace coarse sand and fine gravel, wet.	125.0	2.0	1.0	23 48 50-1"		
126			530.4					
127		127-131' Grayish brown (10YR5/2) sandy CLAY, few medium sand to coarse gravel, trace cobbles, moist.	127.0	2.0	0.6	16 50-3"		
128								
129				2.0	0.5	43 50-2"		
130								
131			526.4					
132		131-133' Dark grayish brown (10YR4/2) silty CLAY, slightly moist.	131.0	2.0	0.7	25 50-3"	CH	
133			524.4					
134		133-137' Grayish brown (10YR5/2) sandy CLAY, few fine sand to coarse gravel, moist.	133.0	2.0	0.4	100-4"		
135								
136				2.0	0.6	46 50-2"		
137			520.4					
138		137-140' Grayish brown (10YR5/2) clayey fine SAND, few coarse sand to coarse gravel, moist to wet.	137.0	2.0	0.6	24 50-4"		
139								
140			517.4	2.0	0.5	45 50-2"		
141		140-143' Grayish brown (10YR5/2) silty fine SAND, few medium sand to fine gravel, wet. 1" silty clay seam at 141.5'.	140.0					
142				2.0	1.0	7 33 50-2"		
143			514.4					
144		143-149' Grayish brown (10YR5/2) interbedded layers of clayey fine SAND and sandy CLAY, few medium to coarse sand, wet. Silty fine sand, some medium sand to fine grave at 147'	143.0	2.0	0.5	31 50-3"	SW-SC	
145								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
145								
146				2.0	0.3	12 50-3"		
147								
148				2.0	0	75-6"		
149		149-165' Dark grayish brown sandy CLAY, some silt, few medium and coarse sand, trace fine to coarse gravel, moist.	508.4 149.0					
150				2.0	0.8	48 50-3"		
151								
152				2.0	0.8	21 50-3"		
153								
154				2.0	0.5	75-6"		
155								
156				2.0	0.5	75-6"		
157								
158				2.0	0.5	75-6"		
159								
160				2.0	0.5	75-6"		
161								
162				2.0	0.5	75-6"		
163								
164				2.0	0.3	75-6"	SC	
165		165-170' White GYPSUM with thin layers of gray shale and limestone.	492.4 165.0					
166				2.0	0.25	86-3"		
167								
168								
169								
170								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28
Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
170								
171								
172				5	5.0	Core		
173								
174								
175		170-193.4' Dark gray to black SHALE interbedded with gray LIMESTONE, trace gypsum in limestone.	482.4 175.0	0.5	0.5	Core		
176								
177								
178								
179								
180								
181								
182								
183								
184								
185								
186								
187								
188								
189								
190				4.5	4.5	Core		
191								
192								
193			464.0					
194		193.4-202.5 Gray LIMESTONE	193.4					
195								

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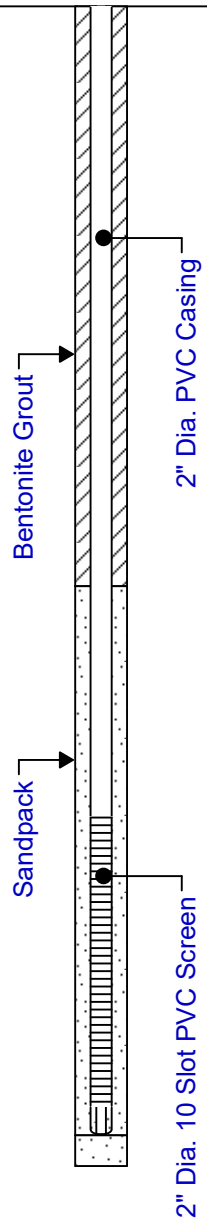
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: DB-28

Start Date: 10-15-15
End Date: 10-27-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
195				5	4.6	Core		
196								
197								
198								
199				5	4.7	Core		
200								
201								
202			454.9					
203		202.5-215' Greenish gray SANDSTONE	202.5					
204								
205				5	4.0	Core		
206								
207								
208								
209								
210				5	4.6	Core		
211								
212								
213								
214								
215			442.4					
216		End of Boring	215.0					
217								
218								
219								
220								



STEARNS DRILLING
6974 Hammond SE
Dutton, Michigan 49316-9116
616/698-7770
FAX 616/698-9886

Job No. 03-9987-6

LOG OF TEST BORING NO. DB-23

Sheet 1 of 3

Project OTTAWA CO. LANDFILL

Location Coopersville, MI

Date Completed 7-1-03

Crew Chief HUNTER
Drill Rig 1050S
Boring Method 4.25 HSA

Hole Plugged With

GROUNDWATER:
Encountered @ 60-68 ft.
After completion ft.
After hrs. ft.
Seepage ft.
Boring Caved at ft.

MONITOR WELL DATA:
Pipe/Type (2" STAINLESS) & (2" PVC)
Length (20') (88.5')
Above Ground 2.5'
Cap J-plug

Screen/Type 2" STAINLESS FJ
Size 5'
Slot 10
Set @ 100-105
Backfilled Sandpack 105-97

Bentonite Seal SLURRY 97-2
Grout/Type QUIK GROUT
Depth
Protective Casing 4" Round
Materials Cleaned

Development AIR DEVELOPE UNTIL CLEAR

REMARKS:

LEGEND:
BlowCount/Blows per 6" w/140# hammer x 30" drop
SS - 2" Split Spoon Sampler
LS - Brass Liner Sample
ST - Shelby Tube Sample
SNR - Sample not recovered

Type		Count	Feet	
SS	20"	2 2 4 4	2	Brn. firm clay
SS	20"	5 8 11 10	4	
SS	15"	3 2 2 4	6	
SS	24	2 3 3 7	8	
SS	24	3 4 8 8		
SS	24	2 3 3 7	10	
SS	24	2 5 8 8	12	
SS	24	4 5 6 1	14	
SS	24	2 2 4 6	16	
SS	24	2 2 5 7	18	
SS	24	2 4 6 7	20	
SS	24	2 4 4 4	22	
SS	24	2 3 4 7	24	Gray "soft" clay - little silt
SS	24	1 2 2 3	26	
SS	24	1 2 3 3	28	
SS	24	1 2 3 3	30	
SS	24	1 2 4 5	32	
SS	24	1 4 6 10	34	
SS	24	3 5 8 8	36	
SS	24	3 4 8 7	38	
SS	24	2 5 7 7	40	
SS	24	2 4 6 6	42	Firmer Gray clay
SS	24	2 5 8 11	44	
SS	24	2 5 8 7	46	
SS	24	5 10 10 10	48	
			50	
			52	Hard drilling
SS	24	3 8 11 10	54	
			56	
			58	
SS	24"	3 6 15 11	60	Gray clay w/ 2" sand seam @ 61'

STEARNS DRILLING
6974 Hammond SE
Dutton, Michigan 49316-9116
616/698-7770
FAX 616/698-9886

Job No. 03 9867-6

LOG OF TEST BORING NO. TB-11

Sheet 2 of 3

Project Ottawa Co. Landfill

Location Coopersville, MI

Date Completed 7-1-03

Crew Chief Hunter
Drill Rig 1083
Boring Method 4.25 HSA

Hole Plugged With

GROUNDWATER:
Encountered @ ft.
After completion ft.
After hrs. ft.
Seepage ft.
Boring Caved at ft.

MONITOR WELL DATA:
Pipe/Type
Length
Above Ground
Cap

Screen/Type
Size
Slot
Set @
Backfilled

Bentonite Seal
Grout/Type
Depth
Protective Casing
Materials Cleaned

Development

REMARKS:

LEGEND:
BlowCount/Blows per 6"
w/140# hammer x 30" drop
SS - 2" Split Spoon Sampler
LS - Brass Liner Sample
ST - Shelby Tube Sample
SNR - Sample not recovered

Sample Type	REC	Blow Count	Depth in Feet		SOIL DESCRIPTION	TW
					Gray clay · few sand seams	
			62			
					Gray fine silty sand · wet	
SS	6"	31 87	64	X		
			66	X		
			68			
SS	24"	11 24 26 28	70	X		
			72	X		
			74			
SS	14"	18 31 44 50	76	X		
			78	X		
					Gray/Brnish. Hard clay	
SS	24	17 37 40 45	80	X	Occ. wet fractures in clay	
			82	X		
			84			
SS	24	14 27 53 50	86	X		
			88	X		
SS	24	16 29 41 45	90	X		
			92	X		
SS	24	8 14 38 50	94	X	Grayish fine silty sand · wet	
			96	X		
			98			
					Tan. fine sand · wet	
SS	24	20 54 50 43	100	X		
			102	X		
			104			
SS	20	16 71 50/3"	106	X		
			108	X		
SS	15	27 34 50/5"	110	X		
			112	X		
SS	18	14 57 50/3"	114	X		
			116	X		
					Grayish/Brn clayey silt	
			118			
SS	15	13 24 50/4"	120	X		
				X		

STEARNS DRILLING
6974 Hammond SE
Dutton, Michigan 49316-9116
616/698-7770
FAX 616/698-9886

Job No. 03.9987.6

LOG OF TEST BORING NO. DB-23

Sheet 3 of 3

Project OTTAWA CO. LANDFILL

Location Coopersville, Mi

Date Completed 7.1.03

Crew Chief Hutton
Drill Rig 1050s
Boring Method 4.25 HSA

Hole Plugged With

GROUNDWATER:
Encountered @ ft.
After completion ft.
After hrs. ft.
Seepage ft.
Boring Caved at ft.

MONITOR WELL DATA:
Pipe/Type
Length
Above Ground
Cap

Screen/Type
Size
Slot
Set @
Backfilled

Bentonite Seal
Grout/Type
Depth
Protective Casing
Materials Cleaned

Development

REMARKS:

LEGEND:
BlowCount/Blows per 6"
w/140# hammer x 30" drop
SS - 2" Split Spoon Sampler
LS - Brass Liner Sample
ST - Shelby Tube Sample
SNR - Sample not recovered

Sample Type	REC	Blow Count	Depth in Feet	SOIL DESCRIPTION
			122	Grayish/Brn. clayey silt
SS	15"	14 21 50/4"	124	
			126	
			128	
SS	15"	4 26 50/3"	130	Brn. fine sands. occasional silt seams
			132	
SS	10	29 100/6"	134	
			136	
			138	
SS	20	2 2 3 13	140	
			142	
SS	24	6 4 12 27	144	~ occasional fine gravel zone
			146	
			148	
SS	24	2 2 6 15	150	
			152	
SS	24	1 1 2 11	154	
			156	
			158	
SS	24	1 1 11 22	160	
			162	
SS	18	6 20 50/4"	164	→ Bedrock @ 165'
			166	
			168	E.O.B. @ 165.5'
			170	
			180	

Engineering & Environmental Solutions, LLC

400 136th Avenue
Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
www.goEESolutions.com

Log of Borehole: MM-17

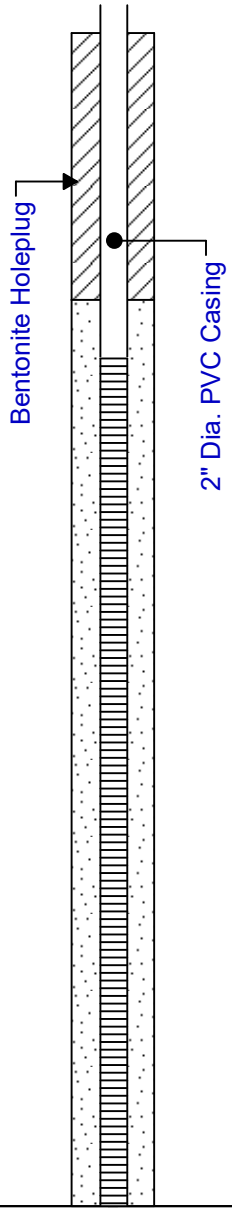
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 671.98
Top of Casing Elevation (feet): 674.54
Logged By: Alex Miedema
Comments:

Start Date: 10-14-15
End Date: 10-14-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 1265.69
Northing: 7019.95

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts
		Ground Surface	671.5			
0		0-13' Yellowish brown (10YR5/6) coarse SAND	0.0			
1						
2						
3						
4						
5				2.0	1.8	1 4 6 8
6						
7						
8						
9						
10				2.0	0.2	8 10 10 18
11						
12						
13		13-51.5' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and nodules.	658.5 13.0			
14						
15		Wet 6" coarse sand seam at 49'		2.0	2.0	3 4 7 8
16						
17						
18						
19						
20				2.0	2.0	2 3 5 6

Well Completion Details



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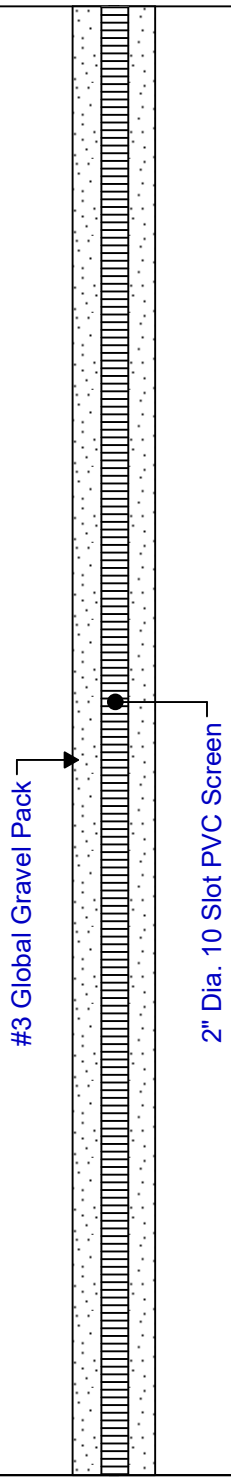
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-17
Start Date: 10-14-15
End Date: 10-14-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
20						5 6	
21							
22							
23							
24							
25				2.0	2.0	2 2 5 5	
26							
27							
28							
29							
30				2.0	2.0	1 2 4 4	
31							
32							
33							
34							
35				2.0	2.0	1 2 5 6	
36							
37							
38							
39							
40				2.0	2.0	2 3 3 3	
41							
42							
43							
44							
45				2.0	2.0	3 4 10 12	



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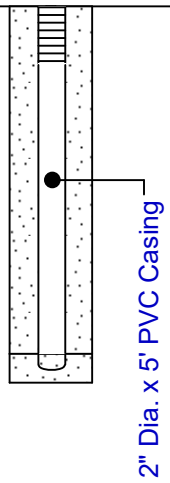
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-17

Start Date: 10-14-15
End Date: 10-14-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
45						10 12	
46							
47							
48							
49							
50				2.0	2.0	3 12 22 19	
51			620.0				
52		End of Boring	51.5				
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							
67							
68							
69							
70							

2" Dia. x 5' PVC Casing

Engineering & Environmental Solutions, LLC

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Building 100, Suite B
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Log of Borehole: MM-18

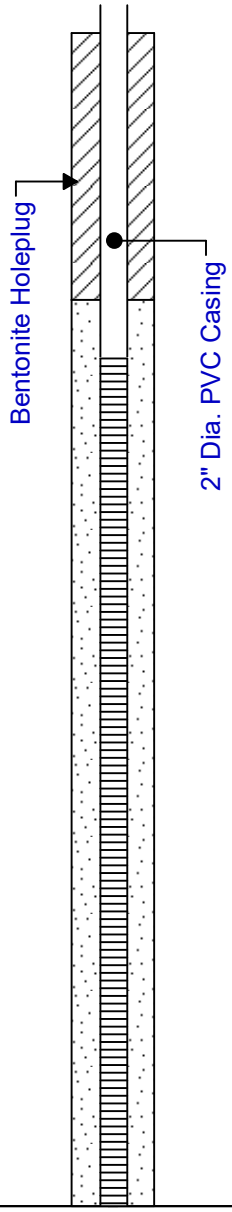
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 679.04
Top of Casing Elevation (feet): 681.57
Logged By: Alex Miedema
Comments:

Start Date: 10-14-15
End Date: 10-14-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 1088.76
Northing: 4809.5

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts
		Ground Surface	679.0			
0		0-4.5' Dark yellowish brown (10YR4/4) coarse SAND	0.0			
1						
2						
3						
4			674.5			
5		4.5-6' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and nodules.	4.5	2.0	1.8	3 8 7 7
6			673.0 6.0			
7		6-24' Yellowish brown (10YR5/2) silty CLAY. Mottles: 5% (10YR6/1) Gray 5% (10YR6/6) Brownish yellow				
8						
9						
10				2.0	2.0	3 6 8 14
11						
12						
13						
14						
15				2.0	2.0	3 7 10 11
16						
17						
18						
19						
20				2.0	2.0	2 4 5 9

Well Completion Details



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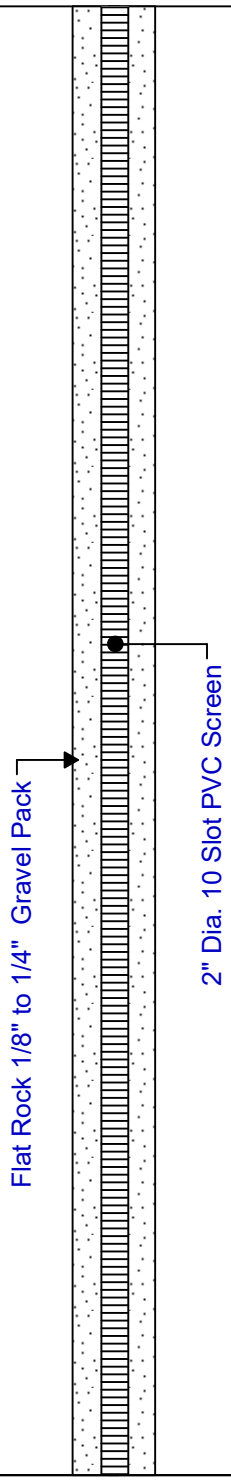
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-18
Start Date: 10-14-15
End Date: 10-14-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
20						5 9	
21							
22							
23							
24		24-56.5' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules.	655.0 24.0	2.0	2.0	2 3 4 6	
25							
26							
27							
28							
29				2.0	2.0	1 3 5 6	
30							
31							
32							
33							
34				2.0	2.0	2 2 5 5	
35							
36							
37							
38							
39				2.0	2.0	1 3 6 6	
40							
41							
42							
43							
44							
45				2.0	2.0	1 1 3 4	



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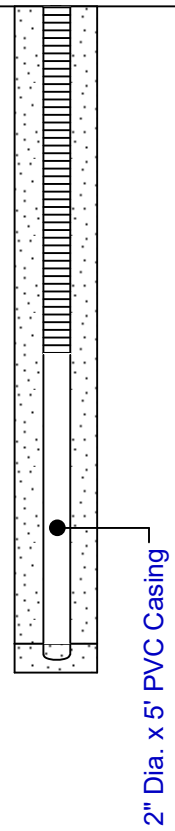
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-18
Start Date: 10-14-15
End Date: 10-14-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
45						3 4	
46							
47							
48							
49							
50				2.0	2.0	2 2 2 3	
51							
52							
53							
54							
55				2.0	2.0	3 4 6 6	
56			622.5				
57		End of Boring	56.5				
58							
59							
60							
61							
62							
63							
64							
65							
66							
67							
68							
69							
70							



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Log of Borehole: MM-19

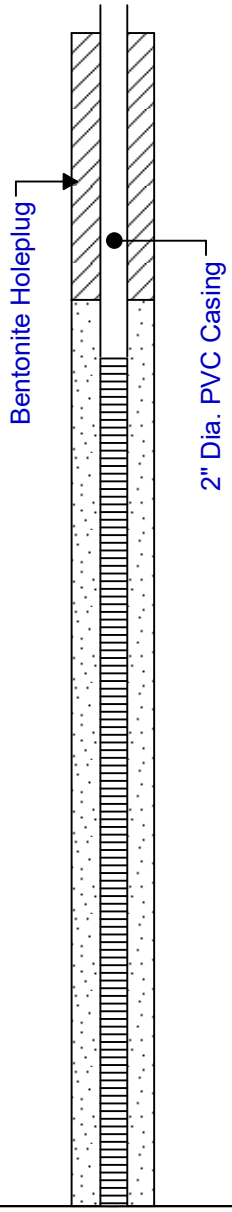
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 672.59
Top of Casing Elevation (feet): 674.91
Logged By: Kurt Van Appledorn
Comments:

Start Date: 10-13-15
End Date: 10-13-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 3751.02
Northing: 4461.97

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts
		Ground Surface	672.6			
0		0-8' Yellowish brown (10YR5/4) silty CLAY, trace fine sand, dry to slightly moist. Mottles 10% Dark grayish brown (10YR4/2)	0.0			
1						
2						
3						
4						
5				2.0	2.0	4 5 5 6
6						
7						
8		8-13' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and fine gravel, slightly moist.	664.6 8.0			
9						
10				2.0	1.2	2 2 3 4
11						
12						
13		13-42' Brown (7.5YR5/3) silty CLAY. Mottles: 20% (10YR5/6) Yellowish brown 10% (10YR5/1) Gray <5% mottles below 19'	659.6 13.0			
14						
15				2.0	2.0	7 9 13 17
16						
17						
18						
19						
20				2.0	2.0	2 5 10 11

Well Completion Details



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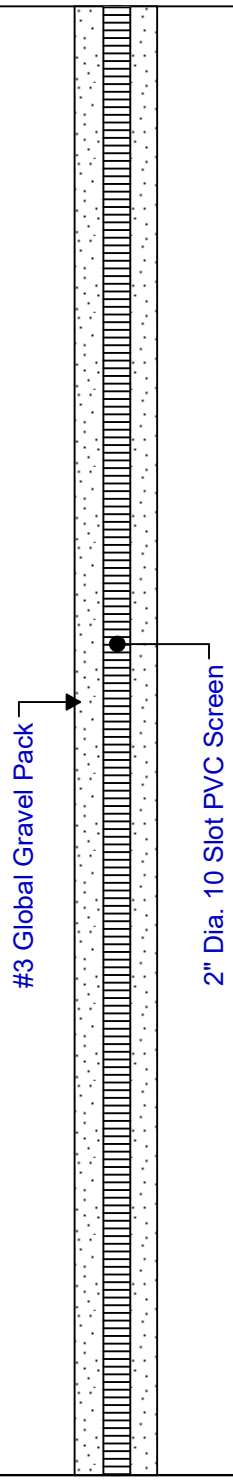
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-19

Start Date: 10-13-15
End Date: 10-13-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
20						10 11	
21							
22							
23							
24							
25				2.0	2.0	2 3 7 7	
26							
27							
28							
29							
30				2.0	2.0	2 3 7 8	
31							
32							
33							
34							
35				2.0	2.0	2 2 5 9	
36							
37							
38							
39							
40				2.0	2.0	1 3 4 5	
41							
42		42-51.5' Dark gray (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules, moist	630.6 / 42.0				
43							
44							
45				2.0	2.0	2 5 5 6	



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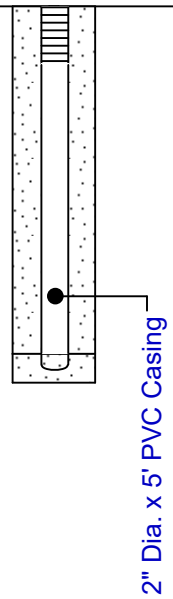
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-19
Start Date: 10-13-15
End Date: 10-13-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
45						5 6	
46							
47							
48							
49							
50				2.0	2.0	2 3 5 6	
51			621.1				
52		End of Boring	51.5				
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							
67							
68							
69							
70							

2" Dia. x 5' PVC Casing

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Log of Borehole: MM-20

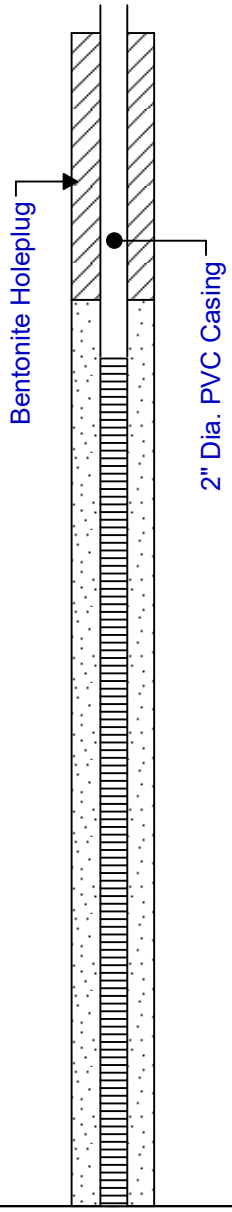
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 655.86
Top of Casing Elevation (feet): 658.51
Logged By: Kurt Van Appledorn
Comments:

Start Date: 10-13-15
End Date: 10-13-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 3749.92
Northing: 6959.81

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts
		Ground Surface	655.9			
0		0-1' Brown silty CLAY TOPSOIL, dry to slightly moist.	0.0			
			654.9			
1		1-6.5' Yellowish brown (10YR5/4) fine SAND, moist.	1.0			
2						
3						
4						
5				2.0	1.7	4 5 5 3
6			649.4			
7		13-42' Brown (10YR4/3) silty CLAY, trace coarse sand and nodules.	6.5			
8		Color changes: (10YR5/1) Gray 8-14'				
9		(10YR5/2) Grayish brown sandy clay, very moist 14-15'				
10		(10YR4/2) Dark grayish brown silty clay 15'-EOB		2.0	1.6	2 6 8 11
11		<5% mottles below 19'				
12						
13						
14						
15				2.0	1.8	2 3 5 5
16						
17						
18						
19						
20				2.0	2.0	3 5 9 10

Well Completion Details



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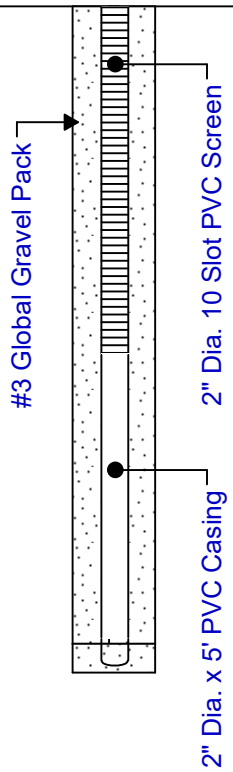
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-20
Start Date: 10-13-15
End Date: 10-13-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
20						9 10	
21							
22							
23							
24				2.0	2.0	2 3 4 6	
25							
26							
27							
28							
29				2.0	2.0	3 4 7 9	
30							
31			624.5 31.4				
32		End of Boring					
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							



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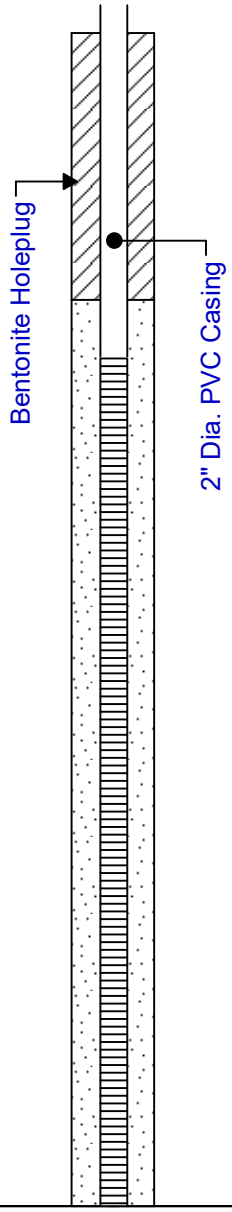
Log of Borehole: MM-21

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" OD HSA
Sampling Method: Shelby Tube
Ground Elevation (feet): 654.73
Top of Casing Elevation (feet): 657.61
Logged By: Kurt Van Appledorn
Comments: Soil Description from DB-26 log

Start Date: 11-13-15
End Date: 11-13-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 6221.47
Northing: 5254.75

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
		Ground Surface	654.7				
0		0-7' Reddish brown (5YR5/3) sandy CLAY, slightly moist. Mottles 10% Dark grayish brown (10YR4/2)	0.0				
1							
2							
3							
4							
5							
6							
7		7-14' Dark grayish brown (10YR4/2) silty CLAY, occassional 0.4' seams of very pale brown (10YR7/3) fine sand.	647.7 / 7.0				
8							
9							
10							
11							
12							
13							
14		14-14.3" Black (10YR2/1) ORGNICS	640.7 / 14.0				
15		14.3-17' Dark gray (10YR4/1) silty CLAY, some organics. Mottles: 20% Yellowish brown (YR5/6) 20% Gray (10YR5/1)					
16							
17		17-20' Brownish yellow (10YR6/6), 20% gray (10YR5/1), silty CLAY	637.7 / 17.0				
18							
19							
20			634.7 / 20.0				



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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-21
Start Date: 11-13-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
20		20-23' Reddish brown (5YR5/4) sandy CLAY.					
21							
22							
23		23-51.5' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and fine gravel and black nodules, moist.	631.7 23.0				
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
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36							
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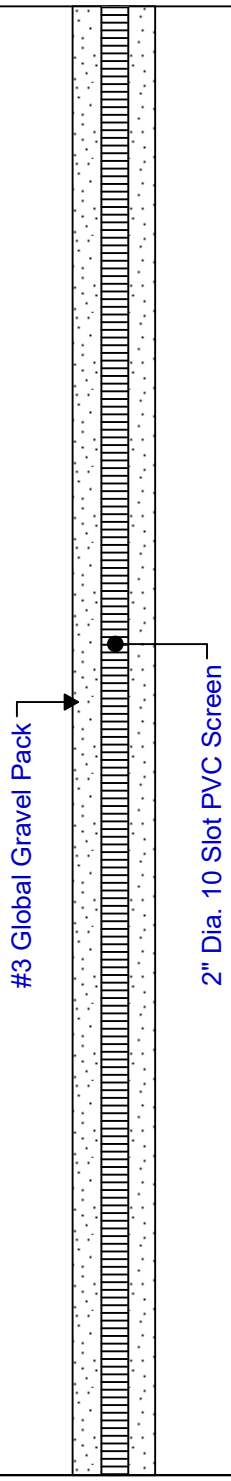
40							
41							
42							
43							
44							
45							



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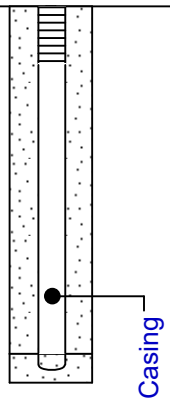
Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: MM-21
Start Date: 11-13-15
End Date: 11-13-15

SUBSURFACE PROFILE				SAMPLE			Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	
45							
46				2.0		Shelby	
47							
48				SS		Shelby	
49							
50							
51			603.2				
52		End of Boring	51.5				
53							
54							
55							
56							
57							
58							
59							
60							
61							
62							
63							
64							
65							
66							
67							
68							
69							
70							



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Log of Borehole: SB-31

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 656.47
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 10-9-15
End Date: 10-9-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5130
Northing: 6250

Comments: Shelby Tube collected at 48-50' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
		Ground Surface	656.5					
0		0-3.0' TOPSOIL	0.0					
1				2.0	1.4	2 3 3 2		
2								
3			653.5 3.0	2.0	1.2	1 1 1 2		
4		3.0-14' Brown (10YR5/3) sandy CLAY. Mottles: 5% (10YR6/1) Gray 5% (10YR6/4) Light yellow brown						
5				2.0	1.7	4 6 7 4		
6								
7				2.0	2.0	3 6 9 11		
8								
9				2.0	1.9	2 6 8 10		
10								
11				2.0	2.0	3 5 8 8		
12								
13				2.0	2.0	2 3 6 7		
14			642.5 14.0					
15		14-66' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules.		2.0	1.5	2 3 5 7		
16								
17				2.0	2.0	1 2 4 5		
18								
19				2.0	2.0	1 1 4 4		
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-31
Start Date: 10-9-15
End Date: 10-9-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	2.0	2 3 7 6		
22								
23				2.0	2.0	1 2 3 3		
24								
25				2.0	2.0	1 1 2 2		
26								
27				2.0	2.0	2 2 3 4		
28								
29				2.0	2.0	1 1 3 4		
30								
31				2.0	2.0	2 2 3 3		
32								
33				2.0	2.0	1 2 3 3		
34								
35				2.0	2.0	1 3 3 3		
36								
37				2.0	2.0	2 3 4 4		
38								
39				2.0	2.0	1 2 4 4		
40								
41				2.0	2.0	2 3 5 4		
42								
43				2.0	2.0	1 2 3 4		
44								
45				2.0	2.0	1 3 2 4		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-31
Start Date: 10-9-15
End Date: 10-9-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						2 4		
46								
47				2.0	2.0	2 2 4 5		
48								
49				2.0		Shelby		
50								
51				2.0	2.0	2 4 4 3		
52								
53				2.0	2.0	2 3 4 4		
54								
55				2.0	2.0	2 3 4 5		
56								
57				2.0	2.0	2 3 5 10		
58								
59				2.0	2.0	3 6 7 9	CL	
60								
61				2.0	2.0	2 5 8 11		
62								
63				2.0	2.0	3 4 9 13		
64								
65				2.0	1.8	2 6 8 12		
66			590.5					
		End of Boring	66.0					
67								
68								
69								
70								

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Log of Borehole: SB-32

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 659.14
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 10-8-15
End Date: 10-8-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5130
Northing: 5770

Comments: Shelby Tubes collected at 40-42 & 42-44' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	659.1					
0		0-0.3' TOPSOIL	0.0					
1		0.3-2.0' Coarse SAND.		2.0	1.6	2 3 3 4		
2		2.0-8.0' Brown sandy CLAY. Mottles: 5% (10YR6/1) Gray 5% (10YR6/6) Brownish yellow	657.1 2.0	2.0	2.0	2 3 5 6		
4				2.0	2.0	4 9 9 11		
6				2.0	2.0	3 5 10 12		
8		14-66' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules below 10'.	651.1 8.0	2.0	2.0	2 4 10 10		
10				2.0	2.0	8 9 10 11		
12				2.0	2.0	2 5 9 9		
14				2.0	1.9	2 3 7 8		
16				2.0	2.0	2 3 5 7		
18				2.0	2.0	2 4 4 6		
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-32
Start Date: 10-8-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	2.0	2 4 5 6		
22								
23				2.0	2.0	1 3 5 6		
24								
25				2.0	2.0	2 3 5 5		
26								
27				2.0	2.0	1 3 5 5		
28								
29				2.0	2.0	2 3 6 6		
30								
31				2.0	2.0	2 4 7 8		
32								
33				2.0	1.9	1 2 5 5		
34								
35				2.0	1.9	1 3 4 6		
36								
37				2.0	2.0	2 3 3 4		
38								
39				2.0	2.0	2 3 6 8		
40								
41				2.0		Shelby		
42								
43				2.0		Shelby		
44								
45				2.0	2.0	2 4 8 8		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-32
Start Date: 10-8-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						8 8		
46								
47				2.0	2.0	2 4 6 7		
48								
49				2.0	2.0	3 4 5 6		
50								
51				2.0	2.0	2 4 5 8		
52								
53				2.0	2.0	1 3 4 4		
54								
55				2.0	2.0	1 4 5 8		
56								
57				2.0	1.5	2 5 10 11		
58								
59				2.0	2.0	2 5 10 16		
60								
61				2.0	2.0	2 7 11 15	CL	
62								
63				2.0	2.0	2 4 10 17		
64								
65				2.0	2.0	3 8 11 16		
66			593.1					
		End of Boring	66.0					
67								
68								
69								
70								

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Log of Borehole: SB-33

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 654.92
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 10-8-15
End Date: 10-8-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5130
Northing: 5275

Comments: Shelby Tubes collected at 48-50' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	654.9					
0		0-2.0' Brown (10YR5/3) sandy CLAY, some organics	0.0	2.0	2.0	5 6 6 7		
1								
2		2.0-9.6' Brown (10YR5/3) silty CLAY with occassional 1"-3" wet fine sand seams. Mottles: 5% (10YR6/1 Gray 5% (10YR5/6) Yellowish brown	652.9 2.0	2.0	2.0	2 4 4 6		
3								
4				2.0	1.5	2 4 3 3		
5								
6				2.0	1.8	2 4 13 11		
7								
8				2.0	2.0	3 4 7 8		
9			645.3					
10		9.6-21' Dark grayish brown (10YR4/2) silty CLAY, trace fine sand to coarse gravel and black nodules. 1" fine sand seam at 10.4'	9.6	2.0	2.0	4 11 16 2		
11								
12				2.0	2.0	4 6 5 6		
13								
14				2.0	2.0	1 2 3 4		
15								
16				2.0	2.0	2 3 6 7		
17								
18				2.0	2.0	2 3 5 5		
19								
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-33
Start Date: 10-8-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21			633.9	2.0	2.0	2 6 8 8		
		21-23.5' Coarse SAND and fine GRAVEL, wet	21.0					
22								
23				2.0	1.9	3 6 9 10		
			631.4					
24		23.5-60' Dark grayish brown (10YR4/2) silty CLAY, trace nodules	23.5					
25				2.0	2.0	2 4 9 8		
26								
27				2.0	2.0	1 2 3 3		
28								
29				2.0	2.0	1 3 5 7		
30								
31				2.0	2.0	2 4 6 7		
32								
33				2.0	1.7	2 5 5 7		
34								
35				2.0	2.0	1 5 6 7		
36								
37				2.0	2.0	2 2 5 5		
38								
39				2.0	2.0	2 3 3 4		
40								
41				2.0	2.0	1 2 3 3		
42								
43				2.0	2.0	1 2 4 4		
44								
45				2.0	2.0	1 2 3 3		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-33
Start Date: 10-8-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						3 3		
46								
47				2.0	2.0	1 2 2 3		
48								
49				2.0		Shelby		
50								
51				2.0	2.0	3 4 4 4		
52								
53				2.0	1.8	1 2 3 5		
54								
55				2.0	2.0	2 3 5 6		
56								
57				2.0	1.9	1 4 7 8	CL	
58								
59				2.0	1.7	1 6 9 10		
60		End of Boring	594.9 60.0					
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-34

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 651.70
Top of Casing Elevation (feet): NA
Logged By: Kurt Van Appledorn
Comments: Backfilled with bentonite grout

Start Date: 10-12-15
End Date: 10-12-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5130
Northing: 4800

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	651.7					
0		0-4.0' Brown (10YR4/3) sandy CLAY, some organics, slightly moist.	0.0					
1				2.0	1.6	2 3 5 7		
2								
3				2.0	1.7	3 6 8 9		
4		4.0-9.0' Brown (10YR5/3) silty CLAY, slightly moist. Mottles: 5% (10YR6/1) Grayish brown 5% (10YR6/6) Yellowish brown	647.7 4.0					
5				2.0	2.0	3 7 9 15		
6								
7				2.0	2.0	3 5 7 13		
8								
9		9.0-14' Brown (10YR5/3) silty CLAY, trace sand, slightly moist.	642.7 9.0	2.0	2.0	2 5 7 13		
10								
11				2.0	2.0	3 7 9 9		
12								
13				2.0	2.0	3 5 6 8		
14		14-60' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules, slighlty moist.	637.7 14.0					
15				2.0	2.0	2 4 7 8		
16								
17				2.0	2.0	2 3 5 7		
18								
19				2.0	2.0	1 2 4 4		
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-34
Start Date: 10-12-15
End Date: 10-12-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	2.0	2 3 5 6		
22								
23				2.0	2.0	1 2 4 5		
24								
25				2.0	2.0	2 4 8 11		
26								
27				2.0	2.0	1 2 5 5		
28								
29				2.0	2.0	1 3 6 6		
30								
31				2.0	2.0	1 2 4 6		
32								
33				2.0	2.0	1 2 3 3		
34								
35				2.0	2.0	2 2 3 3		
36								
37				2.0	2.0	1 2 3 3		
38								
39				2.0	2.0	1 2 3 3		
40								
41				2.0	2.0	1 3 3 3		
42								
43				2.0	2.0	1 3 4 5		
44								
45				2.0	2.0	1 2 3 4		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-34
Start Date: 10-12-15
End Date: 10-12-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						3 4		
46								
47				2.0	2.0	2 5 6 8		
48								
49				2.0	2.0	2 4 7 8		
50								
51				2.0	2.0	2 3 6 7		
52								
53				2.0	2.0	2 4 7 9		
54								
55				2.0	2.0	3 7 8 9		
56								
57				2.0	2.0	2 6 9 10	CL	
58								
59				2.0	2.0	2 5 7 7		
60		End of Boring	591.7 60.0					
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-35

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.79
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 10-7-15
End Date: 10-8-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5530
Northing: 4800

Comments: Shelby Tubes collected at 42-44' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	649.8					
0		0-5.0' Brown (10YR5/3) sandy CLAY, some organics	0.0					
1				2.0	1.8	7 7 8 7		
2								
3				2.0	1.5	3 4 4 4		
4								
5		5.0-18' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules. Black (10YR2/1) 3" and 1" peat seams at 6.8' and 8.4'. Mottles 8.5'-15': 5% (10YR6/1 Gray 5% (10YR5/6) Yellowish brown	644.8 5.0	2.0	1.3	1 2 2 2		
6								
7				2.0	1.8	1 3 5 6		
8								
9				2.0	2.0	3 7 8 11		
10								
11				2.0	2.0	7 8 13 14		
12								
13				2.0	2.0	3 7 8 9		
14								
15				2.0	2.0	2 6 9 9		
16								
17				2.0	1.8	3 5 10 14		
18			631.8					
		18-19.3' Wet sand	18.0					
19			630.5	2.0	1.8	2 7 6 5		
			19.3					
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-35
Start Date: 10-7-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20		19.3-56' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules						
21				2.0	1.4	4 6 8 9		
22								
23				2.0	1.6	1 2 4 6		
24								
25				2.0	2.0	3 2 6 6		
26								
27				2.0	2.0	1 2 3 5		
28								
29				2.0	2.0	1 3 4 5		
30								
31				2.0	2.0	1 3 3 5		
32								
33				2.0	1.8	2 2 3 3		
34								
35				2.0	2.0	1 2 2 4		
36								
37				2.0	2.0	1 4 4 5		
38								
39				2.0	2.0	1 3 4 4		
40								
41				2.0	2.0	1 3 3 5		
42								
43				2.0		Shelby		
44								
45				2.0	1.8	3 4 7 8		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-35
Start Date: 10-7-15
End Date: 10-8-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45		19.3-56' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules				7 8		
46				2.0	1.9	2 3 5 7		
47								
48				2.0	1.7	4 6 7 9	CL	
49								
50				2.0	2.0	4 8 9 11		
51								
52				2.0	1.5	4 5 6 10		
53								
54				2.0	2.0	3 4 7 9		
55								
56			593.8					
		End of Boring	56.0					
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-36

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.36
Top of Casing Elevation (feet): NA
Logged By: Kurt Van Appledorn

Start Date: 10-6-15
End Date: 10-6-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5930
Northing: 4800

Comments: Shelby Tubes collected at 40-42' & 42-44' bgs. Backfilled with bentonite grou

SUBSURFACE PROFILE / SAMPLE

Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	649.4					
0		0-7.8' Grayish brown (10YR5/2) silty CLAY, trace coarse sand and fine gravel, slightly moist. Color below 4' is brown (10YR5/3) with 10% (10YR6/2)	0.0	2.0	2.0	2 3 5 5		
1								
2				2.0	2.0	3 3 3 3		
3								
4				2.0	2.0	2 2 3 2		
5								
6				2.0	1.5	0 1 1 2		
7			641.6					
8		7.8-8.0' Black (10YR2/1) clayey PEAT, very moist.	7.8	2.0	1.9	1 2 3 5		
9		8.0-9.0' Dark gray (2.5Y4/1) silty CLAY, some organics, moist	640.4 9.0					
10		9.0-20' Brown (10YR4/3) silty CLAY, trace coarse sand, moist. Mottles: 10% Dark yellowish brown (10YR4/4) 10% Gray (10YR6/1) Less than 5% mottles below 18'		2.0	2.0	4 8 12 15		
11								
12				2.0	2.0	2 6 11 13		
13								
14				2.0	2.0	2 4 8 11		
15								
16				2.0	2.0	2 4 7 7		
17								
18				2.0	2.0	3 4 7 7		
19								
20			629.4 20.0					

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-36
Start Date: 10-6-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20		20-44' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules Thin (<1/16") very moist sandy seams between 26' and 28'						
21				2.0	2.0	2 2 5 7		
22								
23				2.0	2.0	4 3 5 5		
24								
25				2.0	2.0	2 4 5 6		
26								
27				2.0	2.0	1 2 5 5		
28								
29				2.0	2.0	2 3 4 5		
30								
31				2.0	1.4	2 6 7 9		
32								
33				2.0	2.0	2 3 7 6		
34								
35				2.0	2.0	1 4 7 8		
36								
37				2.0	2.0	1 4 8 8		
38								
39				2.0	2.0	1 3 5 6		
40								
41				2.0	2.0	Shelby		
42								
43				2.0	2.0	Shelby		
44		44-45' Dark grayish brown (10YR4/2) silty CLAY, some fine sand, very moist.	605.4 44.0 604.4					
45			45.0	2.0	2.0	5 6 9 13		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-36
Start Date: 10-6-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45		45-58' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel nodules, moist.				9 13		
46				2.0	1.6	1 4 7 8		
47								
48				2.0	1.8	1 3 3 5		
49								
50				2.0	2.0	1 4 7 8		
51								
52				2.0	2.0	2 4 6 7	CL	
53								
54				2.0	2.0	3 4 6 9		
55								
56				2.0	2.0	2 4 5 5		
57			591.4					
58		End of Boring	58.0					
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-37

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.99
Top of Casing Elevation (feet): NA
Logged By: Kurt Van Appledorn

Start Date: 10-7-15
End Date: 10-7-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5930
Northing: 5220

Comments: Shelby Tube collected at 40-42' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
		Ground Surface	650.0					
0		0-3.4' Dark grayish brown (10YR4/2) silty CLAY, occassional 1"-6" silt seams (10YR5/2) grayish brown, dry to slightly moist. Color below 4' is brown (10YR5/3) with 10% (10YR6/2)	0.0	2.0	1.8	4 5 5 7		
1								
2				2.0	1.7	2 3 4 5		
3			646.6					
4		3.4-4.6' Very dark gray (10YR3/1) silty CLAY, some organics (10YR3/6) dark yellowish brown, slightly moist.	3.4 / 645.4					
5		4.6-16' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand and black nodules, slightly moist. Mottles: 10% (10YR6/1) Gray, <5% (10YR4/6) Dark yelowish brown. Moist 1" (5YR5/4) reddish brown, sandy silty clay at 9.8'. 1" dry to moist (5YR5/4) Reddish brown silty clay seam at 12.6'	4.6	2.0	2.0	2 5 6 9		
6								
7				2.0	2.0	3 8 12 13		
8								
9				2.0	2.0	3 6 12 15		
10								
11				2.0	1.7	3 5 15 14		
12								
13				2.0	1.6	4 9 8 8		
14								
15				2.0	2.0	2 4 5 8		
16			634.0					
17		16-20' Dark gray (10YR4/1) silty CLAY, few fine sand, trace fine gravel and black nodules, occassional moist to very moist sandy silt seams, moist.	16.0	2.0	2.0	2 3 6 6		
18								
19				2.0	2.0	2 3 6 8		
20			630.0 / 20.0					

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-37
Start Date: 10-7-15
End Date: 10-7-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20		20-56' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and nodules Thin (1/8") sandy clay seam at 36.5'						
21				2.0	2.0	3 7 7 7		
22								
23				2.0	2.0	2 4 7 8		
24								
25				2.0	2.0	2 4 7 8		
26								
27				2.0	2.0	2 4 6 8		
28								
29				2.0	2.0	1 3 5 6		
30								
31				2.0	2.0	2 3 4 7		
32								
33				2.0	2.0	2 4 7 6		
34								
35				2.0	1.8	2 3 8 7		
36								
37				2.0	2.0	2 3 5 6		
38								
39				2.0	2.0	2 5 6 7		
40								
41				2.0	2.0	2 5 8 9		
42								
43				2.0		Shelby		
44								
45				2.0	2.0	2 4 6 6		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-37
Start Date: 10-7-15
End Date: 10-7-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						6 6		
46								
47				2.0	2.0	2 3 5 6		
48								
49				2.0	2.0	1 3 6 7	CL	
50								
51				2.0	2.0	2 6 12 17		
52								
53				2.0	2.0	3 8 10 14		
54								
55				2.0	2.0	2 7 10 12		
56		End of Boring	594.0 56.0					
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-38

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 657.57
Top of Casing Elevation (feet): NA
Logged By: Kurt Van Appledorn

Start Date: 10-5-15
End Date: 10-6-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 92
Easting: 5530
Northing: 5570

Comments: Shelby Tube collected at 50-52' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
		Ground Surface	657.6					
0		0-14' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand, moist. Occassional thin sandy seams with roots in upper 4'. Color below 4' is brown (10YR5/3) with 20% Gray (2.5Y5/1) mottles to 10'. Less than 10% gray mottles from 10' to 14'.	0.0					
1				2.0	2.0	4 4 4 6		
2								
3				2.0	2.0	2 4 7 8		
4								
5				2.0	2.0	3 8 14 11		
6								
7				2.0	2.0	4 7 14 15		
8								
9				2.0	2.0	5 8 14 13		
10								
11				2.0	2.0	4 7 10 12		
12								
13				2.0	0.4	2 4 6 6		
14			643.6					
		14-92' Darkgrayish brown (10YR4/2) silty CLAY, trace fine gravel sized dark gray to black nodules, slightly moist.	14.0					
15				2.0	1.2	3 3 7 8		
16								
17				2.0	2.0	2 4 5 5		
18								
19				2.0	2.0	2 2 5 4		
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-38
Start Date: 10-5-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	2.0	2 4 7 8		
22								
23				2.0	2.0	2 3 6 6		
24								
25				2.0	2.0	2 3 5 6		
26								
27				2.0	2.0	2 2 4 5		
28								
29				2.0	2.0	3 3 5 6		
30								
31				2.0	1.4	5 6 6 7		
32								
33				2.0	2.0	1 2 5 5		
34								
35				2.0	2.0	3 4 6 10		
36								
37				2.0	2.0	1 4 4 5		
38								
39				2.0	2.0	2 4 4 5		
40								
41				2.0	2.0	2 4 5 7		
42								
43				2.0	2.0	3 3 5 6		
44								
45				2.0	2.0	3 4 7 9		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-38
Start Date: 10-5-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						7 9		
46								
47				2.0	2.0	1 3 4 4		
48								
49				2.0	2.0	2 3 4 4		
50								
51				2.0	2.0	Shelby		
52								
53				2.0	2.0	3 4 4 4		
54								
55				2.0	2.0	2 5 6 10		
56								
57				2.0	2.0	2 4 9 10		
58								
59				2.0	2.0	3 6 7 10		
60								
61				2.0	2.0	4 7 10 13	CL	
62								
63				2.0	2.0	2 5 8 12		
64								
65								
66								
67								
68								
69								
70				2.0	2.0	2 5 8 9		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-38
Start Date: 10-5-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
70						8 9		
71								
72								
73								
74								
75				2.0	2.0	5 12 17 16		
76								
77								
78								
79								
80				2.0	2.0	4 9 14 14		
81								
82								
83								
84								
85				2.0	2.0	4 8 17 24		
86								
87								
88								
89								
90				2.0	2.0	5 9 14 19		
91								
92		92-99' Grayish brown (10YR5/2) silty fine SAND, wet	565.6 92.0					
93								
94								
95				2.0	2.0	2 2 3 8		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-38
Start Date: 10-5-15
End Date: 10-6-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
95						3 8		
96								
97								
98								
99			558.6					
		99-101' Grayish brown (10YR5/2) silty CLAY, trace fine sand, moist. 1" fine sand seam at 100.7'	99.0	2.0	2.0	11 20 34 45		
100								
101			556.6					
		101-111' Grayish brown (10YR5/2) silty fine SAND, wet	101.0					
102								
103								
104								
105				2.0	1.0	9 13 27 41	SC	
106								
107								
108								
109								
110				2.0	1.0	30 51 50 for 4"	SC	
111			546.6					
		End of Boring	111.0					
112								
113								
114								
115								
116								
117								
118								
119								
120								

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Log of Borehole: SB-39

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.61
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema
Comments: Backfilled with bentonite grout

Start Date: 10-7-15
End Date: 10-7-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5930
Northing: 5630

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
		Ground Surface	649.6					
0–5		0-5.0' Brown (10YR4/3) sandy CLAY, some organics	0.0	2.0	2.0	3 4 6 6		
				2.0	2.0	2 2 3 5		
			644.6	2.0	2.0	2 5 8 11		
5–14		5.0-14' Dark grayish brown (10YR4/2) silty CLAY. Mottles: 5% (10YR6/1 Gray 5% (10YR5/6) Yellowish brown	5.0	2.0	2.0	2 5 11 12		
				2.0	2.0	4 7 10 11		
				2.0	2.0	3 6 11 14		
				2.0	2.0	3 5 10 10		
			635.6					
14–20		14-54' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules Soft 1" wet seams at 28.7' and 35' Sandy clay seam at 46.9-37.4'	14.0	2.0	2.0	2 4 7 8		
				2.0	2.0	2 3 6 6		
				2.0	2.0	2 4 5 6		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-39
Start Date: 10-7-15
End Date: 10-7-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	2.0	1 3 5 7		
22								
23				2.0	2.0	2 3 5 5		
24								
25				2.0	2.0	2 3 6 8		
26								
27				2.0	2.0	1 2 3 5		
28								
29				2.0	2.0	1 1 3 4		
30								
31				2.0	1.8	1 2 3 4		
32								
33				2.0	2.0	1 2 4 4		
34								
35				2.0	1.9	1 1 2 3		
36								
37				2.0	1.9	1 3 4 7		
38								
39				2.0	2.0	2 2 5 7		
40								
41				2.0	2.0	3 5 8 9		
42								
43				2.0	2.0	2 3 6 6		
44								
45				2.0	2.0	1 3 6 7		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-39
Start Date: 10-7-15
End Date: 10-7-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						6 7		
46								
47				2.0	1.8	2 3 4 4		
48								
49				2.0	2.0	2 5 7 8		
50								
51				2.0	2.0	2 5 8 9	CL	
52								
53				2.0	2.0	4 9 28 15		
54			595.6 54.0					
		End of Boring						
55								
56								
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-40

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 650.4
Top of Casing Elevation (feet): NA
Logged By: Kurt Van Appledorn

Start Date: 10-12-15
End Date: 10-12-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): NA
Easting: 5630
Northing: 6050

Comments: Shelby Tube collected at 42-44' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	650.4					
0		0-0.9' Very dark grayish brown (10YR3/2) silty CLAY, some organics, slightly moist.	0.0					
			649.5					
1		0.9-12.3' Dark gray (10YR3/1) silty CLAY, trace fine gravel, trace roots in upper 4", slightly moist. Mottles: 10% (10YR5/2) Grayish brown 5% (10YR5/4) Yellowish brown	0.9	2.0	1.7	2 5 5 8		
2		Color below 6' is (10YR4/3) brown with <5% mottles						
3				2.0	1.5	4 8 10 11		
4								
5				2.0	2.0	3 6 9 13		
6								
7				2.0	1.5	4 9 15 14		
8								
9				2.0	2.0	3 5 11 13		
10								
11				2.0	2.0	3 9 8 9		
12			638.1					
		4.6-16' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules, slightly moist.	12.3					
13				2.0	2.0	2 6 10 10		
14		Very moist (<1/8" to 1/2") seams of sandy clay @ 29.8' and 31.5'						
15		Very moist silty clay at 35-35.3'		2.0	2.0	2 5 8 7		
16								
17				2.0	2.0	3 5 8 9		
18								
19				2.0	2.0	2 3 6 9		
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-40
Start Date: 10-12-15
End Date: 10-12-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21				2.0	1.7	2 5 5 6		
22								
23				2.0	1.9	2 3 5 8		
24								
25				2.0	2.0	2 5 8 9		
26								
27				2.0	2.0	2 5 8 8		
28								
29				2.0	2.0	1 2 5 6		
30								
31				2.0	2.0	1 2 3 5		
32								
33				2.0	2.0	2 3 5 5		
34								
35				2.0	2.0	1 2 3 4		
36								
37				2.0	1.6	1 2 4 5		
38								
39				2.0	2.0	1 2 4 5		
40								
41				2.0	2.0	2 3 3 4		
42								
43				2.0		Shelby		
44								
45				2.0	2.0	4 5 6 8		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-40
Start Date: 10-12-15
End Date: 10-12-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						6 8		
46								
47				2.0	2.0	4 7 6 8		
48								
49				2.0	2.0	2 2 6 8	CL	
50								
51				2.0	2.0	3 6 12 11		
52								
53				2.0	2.0	3 7 10 13		
54								
55				2.0	2.0	3 6 8 7		
56		End of Boring	594.4 56.0					
57								
58								
59								
60								
61								
62								
63								
64								
65								
66								
67								
68								
69								
70								

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Log of Borehole: SB-41

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.50
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 11-23-15
End Date: 11-23-15
Driller: Stearns Drilling
Crew Chief: Jerry
Depth to Water (ft BGS during drilling): 63.1
Easting: 5560
Northing: 6375

Comments: Shelby Tube collected at 38-40' bgs. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	649.5					
0		0-30' Blind Drilled through clay	0.0					
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-41
Start Date: 11-23-15
End Date: 11-23-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30			619.5 30.0					
31		30-63.1' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules, slightly moist.		2.0	2.0	1 2 3 3		
32								
33				2.0	2.0	2 3 5 5		
34								
35				2.0	2.0	2 3 4 5		
36								
37				2.0	2.0	2 2 4 8		
38								
39				2.0		Shelby		
40								
41				2.0	2.0	2 4 7 8		
42								
43				2.0	2.0	2 2 3 5		
44								
45				2.0	2.0	2 3 5 5		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-41
Start Date: 11-23-15
End Date: 11-23-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						5 5		
46								
47				2.0	2.0	2 3 7 9		
48								
49				2.0	1.8	2 3 11 12		
50								
51				2.0	1.9	8 9 10 15		
52								
53				2.0	2.0	3 8 11 17		
54								
55				2.0	2.0	3 8 15 16		
56								
57				2.0	2.0	3 6 12 17		
58								
59				2.0	2.0	7 9 19 22		
60								
61				2.0	1.9	8 17 37 40		
62								
63			586.4	2.0	1.8	3 7 7 14		
		63.1-84' Grayish brown (10YR5/2) silty fine SAND, some medium to coarse sand, few fine to coarse gravel, wet.	63.1					
64								
65				2.0	1.2	3 19 24 31		
66								
67				2.0	1.1	2 3 18 30	SW-SM	
68								
69				2.0	1.2	14 39 50-6"		
70								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-41
Start Date: 11-23-15
End Date: 11-23-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
70								
71				2.0	0.5	12 50-5"	SW-SM	
72								
73				2.0	1.2	8 36 50-5"		
74								
75				2.0	0.5	27 50-4"		
76								
77				2.0	0.6	22 40 50-6"		
78								
79				2.0	0.9	17 50-5"	SW-SM	
80								
81				2.0	1.1	14 26 43 50-3"		
82								
83				2.0	1.1	18 45 50-4"		
84			565.5					
		End of Boring	84.0					
85								
86								
87								
88								
89								
90								
91								
92								
93								
94								
95								

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Log of Borehole: SB-42

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 657.46
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 12-14-15
End Date: 12-15-15
Driller: Remedial Services Division
Crew Chief: Bob
Depth to Water (ft BGS during drilling):
Easting: 5455
Northing: 5962

Comments: Shelby Tube collected at 40-42'. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	657.5					
0		0-30' Blind Drilled through clay	0.0					
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-42
Start Date: 12-14-15
End Date: 12-15-15

SUBSURFACE PROFILE				SAMPLE				Well Completion Details
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30			627.5 30.0					
31		30-74.4' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules.		2.0	1.7	1 4 6 10		
32								
33				2.0	2.0	11 2 4 4		
34								
35				2.0	2.0	2 4 6 7		
36								
37				2.0	2.0	1 2 3 3		
38								
39				2.0	20	1 1 8 4		
40								
41				2.0		Shelby		
42								
43				2.0	2.0	1 2 3 5		
44								
45				2.0	2.0	1 3 4 5		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-42
Start Date: 12-14-15
End Date: 12-15-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						4 5		
46								
47				2.0	2.0	1 3 4 6		
48								
49				2.0	2.0	1 3 4 5		
50								
51				2.0	2.0	1 2 4 6		
52								
53				2.0	1.9	4 7 10 13		
54								
55				2.0	0.6	2 7 10 14		
56								
57				2.0	2.0	1 4 7 11		
58								
59				2.0	2.0	2 8 12 15		
60								
61				2.0	1.4	1 3 8 13		
62								
63				2.0	2.0	1 4 7 10		
64								
65				2.0	2.0	3 6 6 9		
66								
67								
68								
69				2.0	2.0	1 5 7 2		
70								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-42

Start Date: 12-14-15
End Date: 12-15-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
70								
71				2.0	2.0	2 6 7 10		
72								
73				2.0	2.0	2 9 13 20		
74			583.1					
75		74.4-75.0' Dark grayish brown (10YR4/2), fine SAND, wet	74.4	2.0	1.2	12 29 68 64		
76		75.0-77.0' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules.						
77		77.0-84.0' Dark grayish brown (10YR4/2), fine SAND, wet	580.5 77.0	2.0	1.1	10 34 40 50-5"	SC	
78								
79				2.0	1.5	21 16 11 6		
80								
81				2.0	2.0	11 22 31 31	SC	
82								
83				2.0	2.0	17 32 44 50	SC	
84			573.5					
85		84.0-86.0' Dark grayish brown (10YR4/2), silty fine SAND, trace coarse sand and fine gravel, wet.	84.0 571.5	2.0	2.0	7 21 33 48		
86		End of Boring	86.0					
87								
88								
89								
90								
91								
92								
93								
94								
95								

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Log of Borehole: SB-43

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 652.28
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 12-15-15
End Date: 12-18-15
Driller: Remedial Services Division
Crew Chief: Bob
Depth to Water (ft BGS during drilling):
Easting: 5108
Northing: 5005

Comments: Shelby Tube collected at 40-42'. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	652.3					
0		0-30' Blind Drilled through clay	0.0					
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-43
Start Date: 12-15-15
End Date: 12-18-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30			622.3 30.0					
31		30-111.2' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules, moist.		2.0	2.0	2 2 2 2		
32								
33				2.0	2.0	1 1 2 3		
34								
35				2.0	2.0	1 2 3 3		
36								
37				2.0	2.0	2 2 2 2		
38								
39				2.0	2.0	1 2 2 3		
40								
41				2.0		Shelby		
42								
43				2.0	2.0	2 2 2 4		
44								
45				2.0	2.0	2 2 3 4		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-43
Start Date: 12-15-15
End Date: 12-18-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						3 4		
46								
47				2.0	2.0	0 2 3 5		
48								
49				2.0	2.0	3 5 6 16		
50								
51				2.0	1.7	2 3 5 7		
52								
53				2.0	2.0	2 4 5 6		
54								
55				2.0	2.0	3 6 7 9		
56								
57				2.0	2.0	3 7 8 9		
58								
59				2.0	1.8	1 5 2 7		
60								
61				2.0	1.8	2 3 6 7		
62								
63				2.0	2.0	2 4 5 6		
64								
65				2.0	2.0	1 1 2 3		
66								
67				2.0	2.0	2 2 3 3		
68								
69				2.0	2.0	1 2 5 9		
70								

Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-43
Start Date: 12-15-15
End Date: 12-18-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
70								
71				2.0	2.0	2 4 5 6		
72								
73				2.0	2.0	2 4 6 7		
74								
75				2.0	2.0	1 5 8 11		
76								
77				2.0	2.0	2 6 10 9		
78								
79				2.0	2.0	1 4 8 10		
80								
81				2.0	2.0	2 3 5 11		
82								
83				2.0	2.0	3 8 11 12		
84								
85				2.0	2.0	1 4 5 7		
86								
87				2.0	2.0	1 2 3 4		
88								
89				2.0	2.0	1 4 6 9		
90								
91				2.0	2.0	1 2 5 8		
92								
93				2.0	2.0	3 4 8 9		
94								
95				2.0	2.0	11 6 8 10		

Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-43
Start Date: 12-15-15
End Date: 12-18-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
95						8 10		
96								
97				2.0	2.0	15 8 11 15		
98								
99				2.0	2.0	3 9 11 12		
100								
101				2.0	2.0	2 4 6 9		
102								
103				2.0	2.0	9 4 6 11		
104								
105				2.0	2.0	24 17 25 30		
106								
107				2.0	0	50-1.5"		
108								
109				2.0	0.7	11 50-3"		
110								
111			541.1	2.0	2.0	18 20 23 12		
		111.2-112.4' Dark grayish brown (10YR4/2) fine SAND, wet.	111.2				SC	
112			539.9					
		112.4-114.1' Dark grayish brown (10YR4/2), silty CLAY, wet.	112.4	2.0	2.0	14 20 24 26		
113								
114			538.2					
		114.1-114.6' Dark grayish brown (10YR4/2) fine SAND, wet.	114.1				SC	
115		114.6-115' Dark grayish brown (10YR4/2) CLAY		2.0	2.0	6 6 12 18	SC	
116		115-115.5' Dark grayish brown (10YR4/2) clayey SAND, wet						
		115.5-116' Dark grayish brown (10YR4/2) CLAY	535.3	1.75	1.75	6 19 39 50-3"	SC	
117		116-117' Dark grayish brown (10YR4/2) fine SAND, wet	117.0 534.5					
118		117-117.75' Dark grayish brown (10YR4/2) CLAY	117.8					
119		End of Boring						
120								

Engineering & Environmental Solutions, LLC

400 136th Avenue
Building 100, Suite B
Holland, Michigan 49424
Phone/Fax: (616) 994-6541
www.goEESolutions.com

Log of Borehole: SB-44

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI
Drilling Method: 8.25" O.D. HSA
Sampling Method: 2' Split Spoon
Ground Elevation (feet): 649.95
Top of Casing Elevation (feet): NA
Logged By: Alex Miedema

Start Date: 12-18-15
End Date: 12-22-15
Driller: Remedial Services Division
Crew Chief: Bob
Depth to Water (ft BGS during drilling):
Easting: 5647
Northing: 4993

Comments: Shelby Tube collected at 40-42'. Backfilled with bentonite grout

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
		Ground Surface	650.0					
0		0-30' Blind Drilled through clay	0.0					
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-44
Start Date: 12-18-15
End Date: 12-22-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
20								
21								
22								
23								
24								
25								
26								
27								
28								
29								
30			620.0 30.0					
31		30-89.3' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules, moist.		2.0	1.8	3 3 4 8		
32								
33				2.0	1.2	3 4 4 7		
34								
35				2.0	1.2	2 4 4 8		
36								
37				2.0	2.0	3 4 5 5		
38								
39				2.0	2.0	2 3 5 7		
40								
41				2.0		Shelby		
42								
43				2.0	2.0	2 3 5 9		
44								
45				2.0	2.0	3 4 5 10		

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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-44

Start Date: 12-18-15
End Date: 12-22-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
45						5 10		
46								
47				2.0	1.6	2 2 3 4		
48								
49				2.0	0.5	5 6 13 13		
50								
51								
52								
53								
54								
55				2.0	1.5	3 9 6 8		
56								
57								
58								
59								
60				2.0	2.0	2 2 3 6		
61								
62								
63								
64								
65				2.0	1.8	3 3 5 10		
66								
67								
68								
69								
70				2.0	1.9	4 7 7 11		

Engineering & Environmental Solutions, LLC
Holland, Michigan
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Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-44
Start Date: 12-18-15
End Date: 12-22-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
70						7 11		
71								
72								
73								
74								
75				2.0	2.0	2 6 7 12		
76								
77								
78								
79								
80				2.0	1.6	10 7 11 16		
81								
82								
83								
84								
85				2.0	1.4	12 11 13 22		
86								
87								
88								
89		89.3-89.5' Fine sand seam.	560.7 89.3					
90		89.5-99.5' Dark grayish brown (10YR4/2), silty CLAY, trace coarse sand to fine gravel and black nodules, moist.		2.0	1.6	9 11 10 31		
91								
92								
93								
94								
95				2.0	1.0	8 6 6 8		

Engineering & Environmental Solutions, LLC
Holland, Michigan
www.goEESolutions.com

Project Name: Ottawa County Farms LF
Project Number: 001.01-15-002
Site Location: Coopersville, MI

Log of Borehole: SB-44

Start Date: 12-18-15
End Date: 12-22-15

SUBSURFACE PROFILE				SAMPLE				
Depth (feet BGS)	Symbol	Description	Depth/Elev.	Sample Length (feet)	Recovery (feet)	Blow Counts	ASTM Symbol	Well Completion Details
95						6 8		
96								
97								
98								
99			550.5					
100		99.5-99.7' fine SAND seam 99.7-100' Dark grayish brown (10YR4/2) silty CLAY, trace coarse sand to fine gravel and black nodules, moist.	99.5	2.0	0.3	6 13 19 32		
101								
102		100-105' Dark grayish brown (10YR4/2) silty CLAY, some coarse gravel		2.0	0.5	28 32 50		
103								
104				2.0	0.2	12 16 22 26		
105								
106								
107		105-113' Dark grayish brown (10YR4/2) SILT, trace coarse sand and fine gravel.	543.0 107.0					
108								
109								
110				2.0	1.8	14 22 35 36		
111								
112								
113		116-117' Dark grayish brown (10YR4/2) fine SAND, wet	537.0 113.0					
114								
115				2.0	2.0	Pushed	SC	
116		End of Boring	534.0 116.0					
117								
118								
119								
120								

APPENDIX C

• BORING LOGS, WELL DETAILS, AND WELL DEVELOPMENT FORMS •

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-1 (1 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	214 feet
Geologist/Engineer	BEG, WJB	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4					
1	2" GALVANIZED STEEL RISER; 5% CEMENT/BENTONITE GROUT		1 1 1 1		0.0'-1.5' Black, loose TOPSOIL with medium sand. Dry to moist. No odor.
			2 1 4 8		1.5'-4.0' Light brown, fine SAND. Loose. Moist. No odor.
			2 4 7 9		4.0'-6.0' Light brown/gray CLAY. Medium stiff. Dry. No odor.
6			2 4 9 12		6.0'-8.0' Light brown/gray CLAY. Stiff. Dry. No odor.
			2 5 7 15		8.0'-12.0' Light brown/gray CLAY with fine gravel. Stiff. Dry. No odor.
11			5 15 15 17		
			4 6 9 10		12.0'-14.0' Gray CLAY. Medium stiff. Dry. No odor.
			3 3 6 8		14.0'-16.0' Gray CLAY. Soft to medium stiff. Dry to moist. No odor.
16			2 2 3 5		16.0'-20.0' Gray CLAY. Soft. Moist. No odor.
			2 2 4 6		
21			3 3 6 7		20.0'-24.0' Gray CLAY. Medium stiff. Moist. No odor.
			2 3 5 7		
26			2 3 4 8		24.0'-26.0' Gray CLAY with trace coarse sand and fine gravel. Medium stiff. Moist. No odor.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-1 (2 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	214 feet
Geologist/Engineer	BEG, WJB	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	2" GALVANIZED STEEL RISER; 5¾" CEMENT/BENTONITE GROUT		2 3 4 8		26.0'-30.0' Gray CLAY with trace fine sand. Medium stiff. Moist. No odor.
					28.0'-30.0' Shelby Tube Sample. [SOIL TEST: CL-SANDY LEAN CLAY]
31			4 4 3 5		30.0'-32.0' Gray CLAY. Soft. Moist/dry. No odor.
			1 1 1 3		32.0'-34.0' Gray CLAY with trace coarse sand. Soft. Wet/moist. No odor.
			1 1 3 4		34.0'-36.0' Brown CLAY with trace coarse sand. Soft. Moist. No odor.
36			1 4 6 8		36.0'-38.0' Brown CLAY with seam of fine sand >1" thick. Soft. Wet. No odor.
			3 5 14 14		38.0'-39.5' Gray CLAY. Stiff. Wet. No odor.
					39.5'-40.0' Brown, silty CLAY. Wet. No odor.
41			3 8 10 15		40.0'-42.0' Light brown CLAY with seam of fine, light brown sand @ 41.6'-42'. Wet. Soft. No odor.
			1 1 3 3		42.0'-44.0' Fine, brown SAND and .5' medium, gray clay seam. Wet. No odor. [Water Level=17.0']
			4 6 8 8		44.0'-46.0' Light brown, fine SAND. Wet No odor.
46			4 6 8 12		46.0'-47.5' Light brown, fine SAND with seams of medium, gray clay. Wet.
					47.5'-48.0' Gray, sandy SILT. Stiff. Moist.
			5 8 9 13		48.0'-50.0' Gray, sandy SILT. Stiff. Wet. No odor.
51			3 5 5 8		50.0'-52.0' Gray CLAY. Stiff. Moist. No odor.

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-1 (4 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 214 feet
Date Started 7/05/94
Date Completed 7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	2" GALVANIZED STEEL RISER; 5% CEMENT/BENTONITE GROUT		2 5 8 13		78.0'-80.0' Brown CLAY with trace fine sand. Stiff. Moist/dry.
			4 7 9 14		80.0'-82.0' Brown/gray CLAY with some fine gravel. Stiff.
83			4 6 13 15		82.0'-86.0' Gray, sandy CLAY with some fine gravel. Stiff. Moist to dry.
			4 7 9 11		
			4 7 10 13		86.0'-90.0' Gray CLAY with some fine gravel. Stiff. Dry.
88			5 7 12 13		
			4 7 15 16		90.0'-92.0' Gray CLAY with some fine gravel. Stiff. 4" seam of fine SILT. Wet. No odor.
93			7 12 14 21		92.0'-96.0' Brown/gray CLAY with occasional fine gravel. Stiff. Dry to moist. No odor.
			9 10 17 19		
			3 6 9 15		96.0'-109.0' Gray CLAY with occasional fine gravel. Medium stiff to stiff. Dry to moist. No odor.
98			2 3 5 7		4" seam of fine, clayey SILT. Wet. No odor.
103					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-1 (5 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	214 feet
Geologist/Engineer	BEG, WJB	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
104					
109	2" GALVANIZED STEEL RISER; 63' CEMENT/BENTONITE GROUT	X	5 7 13 15		109.0'-149.0' Brown CLAY with occasional fine gravel. Stiff. Dry. No odor.
114					
119		X	6 13 13 23		
124					
129		X	5 10 15 19		

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-1 (6 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 214 feet
Date Started 7/05/94
Date Completed 7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
131					
136					
			6 9 14 15		4" seam of silty clay. Moist.
141	2" GALVANIZED STEEL RISER; 5% CEMENT/BENTONITE GROUT				
146					
			8 20 13 15		149.0-'159.0' Brown, coarse SAND with some clay. Wet. No odor.
151					
156					

DELL ENGINEERING, INC.

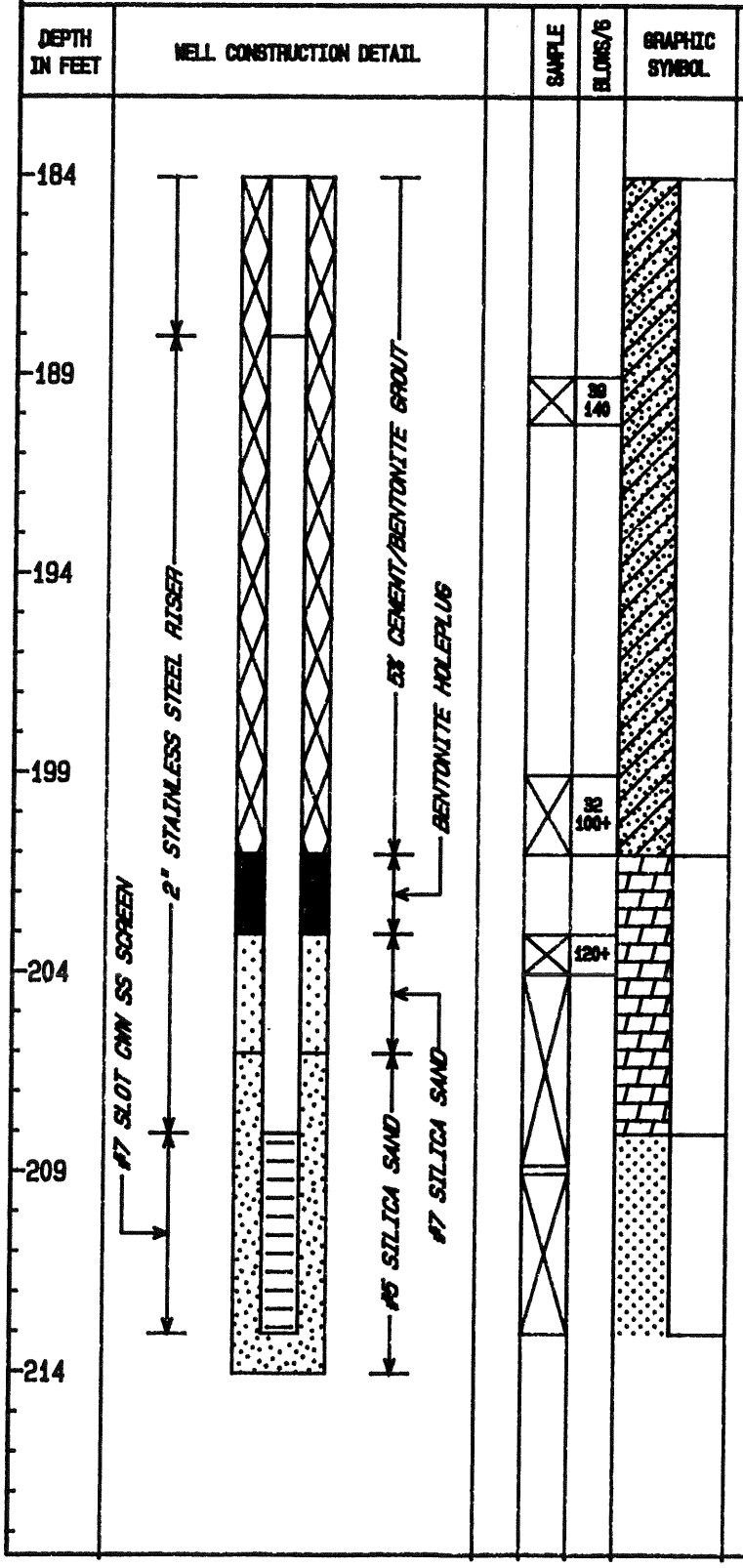
Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-1 (7 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 214 feet
Date Started 7/05/94
Date Completed 7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
158	2" GALVANIZED STEEL RISER; 5% CEMENT/BENTONITE GROUT				
		X	100+		159.0'-163.0' Brown, fine sand with fine gravel.
163					163.0'-201.0' Gray, hard, sandy CLAY with some silt. (Till). Dry.
		X	100+		
168		X	43 100+		
173					
178		X	67 100+		[SOIL TEST: SC-CLAYEY SAND]
183					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-1 (8 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	214 feet
Geologist/Engineer	BEG, WJB	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/08/94



DESCRIPTION

[SOIL TEST: SC-CLAYEY SAND]

[SOIL TEST: SC-CLAYEY SAND]

201.0'-208.0' Gray LIMESTONE.

208.0'-213.0' Gray SANDSTONE.

EOB @ 213.0'.

TOP OF CASING ELEVATION @ 672.66'
GROUND SURFACE ELEVATION @ 670.18'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (1 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4					
1			1 2 2 2		0.0'-1.5' TOPSOIL. Dark brown/black medium sand.
			2 3 6 9		1.5'-10.0' Brown/gray mottled CLAY, some fine silt. Stiff. Dry.
			2 6 10 13		
6			2 7 9 14		
			2 6 8 11		
11			2 4 7 8		10.0'-14.0' Brown CLAY, occasional silt. Stiff. Dry.
			2 4 7 7		
			3 4 5 7		14.0'-16.0 Brown CLAY, occasional silt and fine gravel. Medium stiff to stiff. Dry to moist.
16			2 4 5 7		16.0'-21.0' Gray CLAY, occasional silt. Medium stiff. Moist to dry.
			3 4 6 6		
21			2 2 3 5		21.0'-26.0' Gray CLAY, occasional silt. Soft. Moist.
			1 2 3 4		
26			1 2 3 3		

2" galvanized steel casing

cement/bentonite grout

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

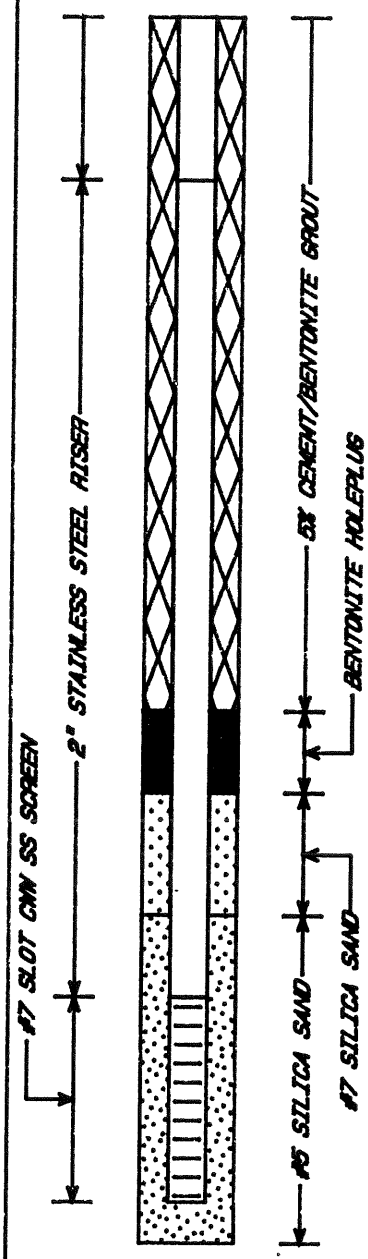
Hole/Well No. DB-2 (2 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 210 feet
Date Started 7/12/94
Date Completed 7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	2" galvanized steel casing; cement/bentonite grout		1 2 3 3		26.0'-28.0' Gray CLAY, occasional silt and coarse sand. Soft. Moist.
			1 1 2 3		28.0'-30.0' Gray CLAY, occasional coarse sand. Soft. Moist.
31			2 3 3 6		30.0'-32.0' Gray CLAY, occasional coarse sand. Medium stiff. Moist.
			2 4 5 8		32.0'-54.0' Gray CLAY, occasional coarse sand. Stiff. Moist.
			2 4 7 6		
36			2 2 4 6		
			3 4 4 7		
41			3 4 7 8		
					42.0'-44.0' Shelby Tube Sample. [SOIL TEST: CL-LEAN CLAY WITH SAND]
			2 3 5 7		
46			2 4 7 9		STATIC WATER LEVEL ELEVATION = 618.95' MEASURED ON 8/17/94
			3 4 7 11		
51					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-1 (8 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	214 feet
Geologist/Engineer	BEG, WJB	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
184					
189			39 140		[SOIL TEST: SC-CLAYEY SAND]
194					
199			32 100+		[SOIL TEST: SC-CLAYEY SAND]
					201.0'-208.0' Gray LIMESTONE.
204			120+		
209					208.0'-213.0' Gray SANDSTONE.
214					EOB @ 213.0'.

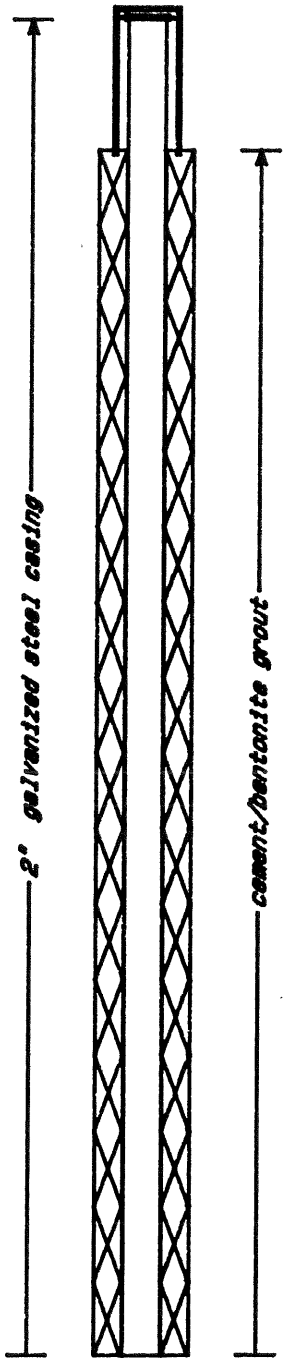


TOP OF CASING ELEVATION @ 672.66'
GROUND SURFACE ELEVATION @ 670.18'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (1 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4					
1			1 2 2 2		0.0'-1.5' TOPSOIL. Dark brown/black medium sand.
			2 3 6 9		1.5'-10.0' Brown/gray mottled CLAY, some fine silt. Stiff. Dry.
			2 6 10 13		
6			2 7 9 14		
			2 6 8 11		
11			2 4 7 9		10.0'-14.0' Brown CLAY, occasional silt. Stiff. Dry.
			2 4 7 7		
			3 4 5 7		14.0'-16.0 Brown CLAY, occasional silt and fine gravel. Medium stiff to stiff. Dry to moist.
16			2 4 5 7		16.0'-21.0' Gray CLAY, occasional silt. Medium stiff. Moist to dry.
			3 4 6 6		
21			2 2 3 5		21.0'-26.0' Gray CLAY, occasional silt. Soft. Moist.
			1 2 3 4		
26			1 2 3 3		



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (2 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	2" galvanized steel casing; cement/bentonite grout		1 2 3 3		26.0'-28.0' Gray CLAY, occasional silt and coarse sand. Soft. Moist.
			1 1 2 3		28.0'-30.0' Gray CLAY, occasional coarse sand. Soft. Moist.
31			2 3 3 6		30.0'-32.0' Gray CLAY, occasional coarse sand. Medium stiff. Moist.
			2 4 5 8		32.0'-54.0' Gray CLAY, occasional coarse sand. Stiff. Moist.
			2 4 7 6		
36			2 2 4 6		
			3 4 4 7		
41			3 4 7 8		
					42.0'-44.0' Shelby Tube Sample. [SOIL TEST: CL-LEAN CLAY WITH SAND]
			2 3 5 7		
46			2 4 7 9		STATIC WATER LEVEL ELEVATION = 618.95' MEASURED ON 8/17/94
			3 4 7 11		
51					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (3 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	2" galvanized steel casing; cement/bentonite grout				
		X	3 4 6 7		54.0'-58.0' Gray CLAY. Medium stiff to stiff. Moist.
57					
		X	2 3 3 4		58.0'-64.0' Gray, sandy CLAY. Soft to medium stiff. Moist.
62					
		X	2 4 7 11		64.0'-69.0' Gray, silty CLAY, occasional coarse sand. Medium stiff to stiff. Moist.
67					
		X	3 7 11 15		69.0'-74.0' Gray CLAY, occasional coarse sand and some silt. Stiff.
72					
		X	2 7 9 12		74.0'-80.0' Gray CLAY, occasional coarse sand to fine gravel. Stiff. Moist to dry.
77					

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-2 (4 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 210 feet
Date Started 7/12/94
Date Completed 7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	2" galvanized steel casing; cement/bentonite grout	X	3 6 9 12		
83		X	3 5 7 10		
88		X	3 4 7 10		
93		X	3 4 6 1		90.0'-95.0' Brown mottled, sandy CLAY with occasional fine gravel (trace pieces of sandstone). Stiff. Moist.
98		X	15 10 15 14		95.0'-99.0' Gray CLAY with occasional fine gravel to coarse sand. Stiff to medium stiff. Moist to dry.
103					99.0'-102.0' Gray/brown, fine SAND. Wet. 4" seam of silty clay with trace sandstone.
					102.0'-114.0' Gray, sandy CLAY, some coarse sand to fine gravel. Stiff. Moist to dry.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (5 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
104	2" galvanized steel casing; cement/bentonite grout				
109					
114					114.0'-124.0' Gray CLAY, some fine sand and trace silt. Stiff.
119					
124					124.0'-133.0' Gray, silty CLAY, trace fine sand. Dry to moist. Stiff.
129					

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-2 (6 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 210 feet
Date Started 7/12/94
Date Completed 7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
130	2" galvanized steel casing; cement/bentonite grout				
					133.0'-154.0' Gray, fine SAND, trace silt. Wet.
135		X	4 7 8 14		[SOIL TEST: SP-POORLY GRADED SAND]
140					
145		X	4 8 8 15		
150					
					154.0'-164.0' Gray/brown fine to medium SAND.
155		X	4 10 14 17		

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-2 (7 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	210 feet
Geologist/Engineer	BEG, WJB	Date Started	7/12/94
Drill Agency	Stearns	Date Completed	7/15/94

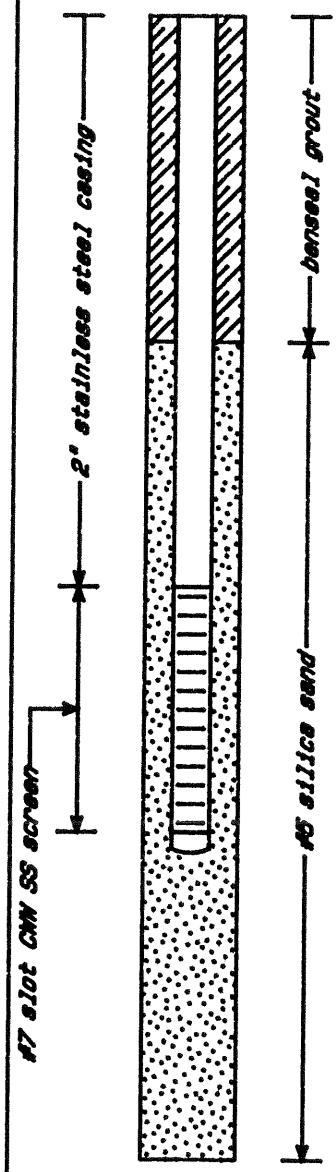
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
156					
161	2" galvanized steel casing; cement/bentonite grout				
		X			164.0'-184.0' Medium to coarse SAND, some gravel. (Used sand bailer)
166					
171					
		X			
176					
181					

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-2 (8 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 210 feet
Date Started 7/12/94
Date Completed 7/15/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
182					
					184.0'-190.0' Medium SAND and GRAVEL. [SOIL TEST: GW-GC GRAVEL WITH CLAY AND SAND]
187					
					190.0'-195.6' BEDROCK. Fractured limestone filled with pyrite.
192					
					195.6'-210.0' SANDSTONE.
197					
202					
207					
					EOB @ 210.0'.
					TOC ELEVATION = 669.46' GROUND ELEVATION = 666.63'
212					



DELL ENGINEERING, INC.

Project: Laidlaw
Location: Ottawa County Farms Landfill
Job No.: 940387
Geologist/Engineer: BEG, WJB
Drill Agency: Stearns

Hole/Well No.: DB-3 (1 of 8)
Diameter of Drill Hole: 4.25" ID HSA
Total Depth of Hole: 215 feet
Date Started: 7/18/94
Date Completed: 7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4					
1	2" galvanized steel casing; cement; cement/bentonite grout				0.0'-2.0' TOPSOIL. Dark brown, clayey, medium sand. Dry. No odor.
					2.0'-5.0' Dark brown, sandy CLAY. Soft. Dry.
6					5.0'-6.5' Brown mottled CLAY, little sand. Dry. No odor.
					6.5'-7.0' Brown, medium SAND seam. Wet.
					7.0'-9.0' Brown, sandy CLAY. Soft. Moist. 4" brown, wet, medium sand seam.
11					9.0'-12.0' Brown mottled CLAY, little coarse sand. Stiff. Dry.
					12.0'-16.0' Gray, silty CLAY, little fine to medium sand. Stiff. Dry to moist.
16					16.0'-18.0' Gray, silty CLAY, little medium to coarse sand. Stiff. Dry to moist.
					18.0'-20.0' Gray, silty CLAY, little medium sand, trace pieces of sandstone Stiff. Dry to moist.
21					20.0'-24.0' Gray, silty CLAY, trace medium sand. Medium stiff to stiff. Moist.
					24.0'-30.0' Gray, silty CLAY, occasional fine gravel. Medium stiff to stiff. Moist.
26					

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-3 (2 of 8)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 215 feet
Date Started 7/18/94
Date Completed 7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	2" galvanized steel casing; cement/bentonite grout		2 3 4 6		
			2 4 5 6		
31			3 5 7 9		30.0'-38.0' Gray, silty CLAY, occasional coarse sand. Stiff. Moist. 2" gray, wet, sandy silt seam @ 37'.
			2 4 5 6		
36			3 6 8 10		
			2 6 7 11		
			5 6 5 6		38.0'-40.0' Gray, silty CLAY, 2' seams of wet, sandy silt. Medium stiff to stiff. Moist.
41			3 3 6 7		40.0'-42.0' Gray, silty CLAY with few pockets of very soft, moist/wet, silty clay. Medium stiff. Dry to moist.
			2 2 3 2		42.0'-44.0' Gray, silty CLAY. Very soft. Moist to wet.
			2 2 4 5		44.0'-48.0' Gray, silty CLAY. Medium stiff to stiff. Moist to dry.
46			2 4 6 7		
					48.0'-50.0' Shelby Tube Sample (3" recovery).
					Gray, silty CLAY, some fine to medium sand. Medium stiff to stiff. Moist to dry.
51			2 3 4 5		50.0'-59.0' Gray, silty CLAY, trace fine sand. Medium stiff to stiff. Moist to dry.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-3 (3 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	2" galvanized steel casing; cement/bentonite grout				
		X			54.0'-56.0' Shelby Tube Sample. [SOIL TEST: CL-SANDY LEAN CLAY]
57					
		X	4 6 9 12		59.0'-64.0' Gray, silty CLAY, some fine sand. Very stiff. Dry.
62					
		X	4 7 11 18		64.0'-69.0' Gray, silty CLAY, little coarse sand to fine gravel. Hard. Dry.
67					
		X	4 5 7 9		69.0'-79.5' Gray, silty CLAY, trace medium to coarse sand. Stiff. Dry.
72					
		X	2 4 6 10		
77					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-3 (4 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	2" galvanized steel casing; cement/bentonite grout				
		X	8 11 10 28		79.5'-80.5 Gray, silty SAND. Moist.
					80.5'-82.0' Gray, sandy CLAY, some silt. Hard. Dry.
					82.0'-89.0' Gray, sandy CLAY, some fine gravel. (possible till) Very hard. Dry.
83		X	45 78 - -		
88		X	46 51 52 -		89.0'-99.0' Sandy, CLAY, some fine gravel. Very hard. Dry.
93		X	30 30 75 -		Seam of gray, wet, fine sand 2" thick.
98		X	17 27 37 45		99.0'-108.0' Sandy CLAY, some fine to coarse gravel. Very hard. Dry.
103					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-3 (5 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
104	2" galvanized steel casing; cement/bentonite grout				
109		X	5 8 10 14		108.0'-114.0' Gray, silty SAND, some fine to coarse gravel. Medium stiff. Wet.
114		X	2 4 6 8		114.0'-124.0' Gray, medium to coarse SAND, some silt. Wet. (Water came up to 44').
119					
124					124.0'-135.0' Gray, medium to coarse SAND, occasional gravel. Wet. [SOIL TEST: SP-POORLY GRADED SAND]
129					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-3 (6 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
133	2" galvanized steel casing; cement/bentonite grout				
			7 7 25 -		135.0'-154.0' Gray, sandy CLAY, some silt. Hard. Wet. [SOIL TEST: CL/CL-ML - CLAY WITH SAND].
138					
			5 8 13 -		[SOIL TEST: CL/CL-ML - CLAY WITH SAND].
143					
148					
153					154.0'-164.0' Gray, clayey SILT, trace fine sand. Wet.
			5 7 16 -		
158					

DELL ENGINEERING, INC.

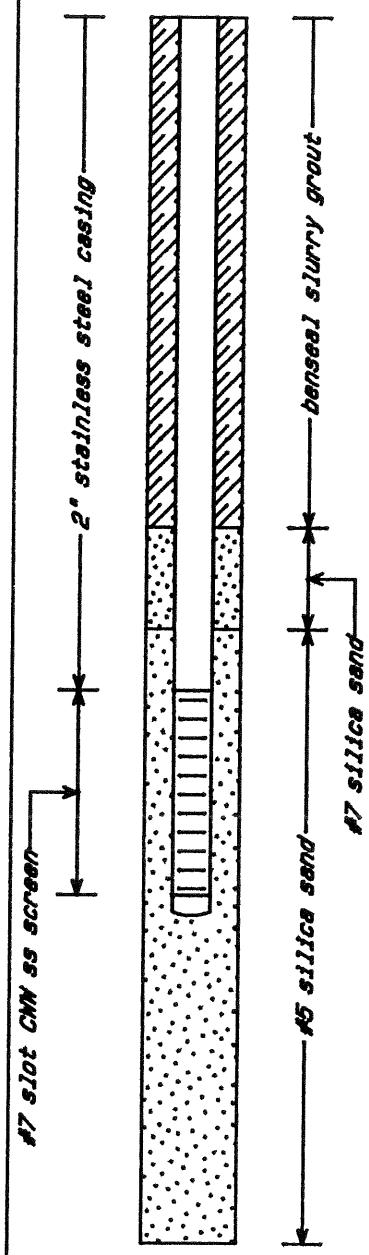
Project	Laidlaw	Hole/Well No.	DB-3 (7 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
159					
164					164.0'-169.0' Gray, clayey SILT, some fine sand.
169	2" galvanized steel casing; benseal slurry grout	X	4 6 7 7		169.0'-181.0' Gray, fine to medium SAND. Wet.
174					
179					181.0'-182.0' Sandy SILT, little clay, occasional coarse sand to fine gravel. Very compact.
184					182.0'-188.0' Gravelly SAND, fine to coarse sand and gravel. Gravel includes quartz, granite, limestone and shale- angular to sub angular.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-3 (8 of 8)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	215 feet
Geologist/Engineer	BEG, WJB	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
185					
					188.0'-190.0' Medium to coarse SAND, occasional fine gravel and clay. Wet.
190					190.0'-191.0' Gray, clayey SILT, some gravel.
					191.0'-196.5' LIMESTONE with horizontal and vertical fractures.
195					
					196.5'-200.0' Gray SANDSTONE.
200					200.0'-205.0' Blue/gray SANDSTONE.
205					205.0'-215.0' Gray SANDSTONE.
210					
215					EOB @ 215.0'.



TOC ELEVATION = 661.74'
GROUND ELEVATION = 658.889'

STATIC WATER LEVEL ELEVATION = 620.0'
MEASURED ON 8/17/94

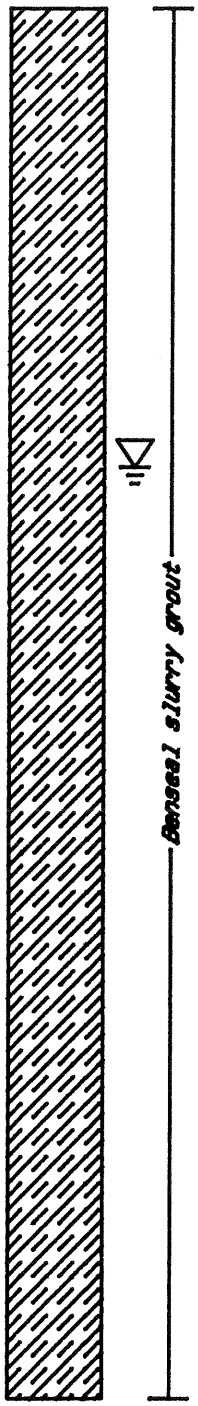
DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-4 (1 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/08/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0	Bensenal slurry grout		24 18 9 6		0.0'-1.8' Fine to coarse, compacted SAND and GRAVEL. Dry.
			9 6 7 8		1.8'-4.2' Brown, silty CLAY with trace fine sand. Stiff.
5			4 6 9 10		4.2'-6.5' Gray to black, silty, fine SAND. Moist.
			2 3 5 7		6.5'-15.9 Brown mottled gray, silty CLAY. Medium stiff.
			4 9 12 14		
10			2 6 10 9		
			4 7 12 14		
15			4 5 8 10		
			3 5 6 8		15.9'-16.1' Medium to coarse SAND and fine GRAVEL. Loose.
					16.1'-18.0' Brown mottled gray CLAY with little silt. Medium stiff.
			3 3 5 6		18.0'-20.0' Gray CLAY with occasional coarse sand to fine gravel. Medium stiff.
20			1 2 3 4		20.0'-24.0' Gray CLAY with occasional coarse sand to fine gravel. Soft.
			2 2 4 4		
			3 4 4 5		24.0'-28.0' Gray CLAY. Soft.
25					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-4 (2 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/08/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26			2 3 4 5		
			2 3 4 5		28.0'-28.5' Gray CLAY with little fine sand and occasional gravel. Soft.
					28.5'-31.0' Brown/gray CLAY. Soft.
31			3 3 5 6		31.0'-31.2' Gray, fine to coarse SAND. Loose. Moist to wet.
			2 3 4 4		31.2'-42.0' Gray CLAY. Soft.
			2 4 3 4		
36			1 3 3 2		
			1 2 4 4		
41			2 2 2 3		
			2 3 6 5		42.0'-44.0' Gray CLAY. Medium stiff. Dry.
			3 6 8 10		44.0'-58.0' Gray CLAY with occasional coarse sand to fine gravel. Stiff.
46			2 5 7 7		
			1 5 6 8		
51					

Bensgal slurry grout

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-4 (3 of 4)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 100 feet
Date Started 7/08/94
Date Completed 7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	Bentonite slurry grout	X	4 5 7 8		
57		X	3 7 9 7		58.0'-63.0' Gray/brown CLAY, occasional coarse sand and fine gravel. Stiff.
62		X	4 5 9 7		63.0'-69.0' Gray CLAY with ocasional coarse sand to fine gravel. Medium stiff.
67		X	1 3 5 5		69.0'-78.0' Brown/gray CLAY. Medium stiff.
72		X	2 4 5 6		
77					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-4 (4 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/08/94
Drill Agency	Stearns	Date Completed	7/08/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	Benseal slurry grout	X	1 3 7 8		78.0'-83.0' Brown/gray CLAY with occasional coarse and to fine gravel. Medium stiff.
83		X	4 8 12 14		83.0'-88.0' Brown/gray CLAY, occasional coarse sand to fine gravel. Medium stiff.
88		X			88.0'-90.0' Shelby Tube Sample. 88.0'-98.0' Gray, sandy CLAY, some silt. Stiff.
93		X	4 7 14 15		
98		X			98.0'-100.0' Shelby Tube Sample. 98.0'-100.0' Gray CLAY, trace silt. Stiff. EOB @ 100.0'. GROUND ELEVATION = 675.70'
103					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-5 (1 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	43 feet
Geologist/Engineer	BEG	Date Started	7/13/94
Drill Agency	Stearns	Date Completed	7/13/94

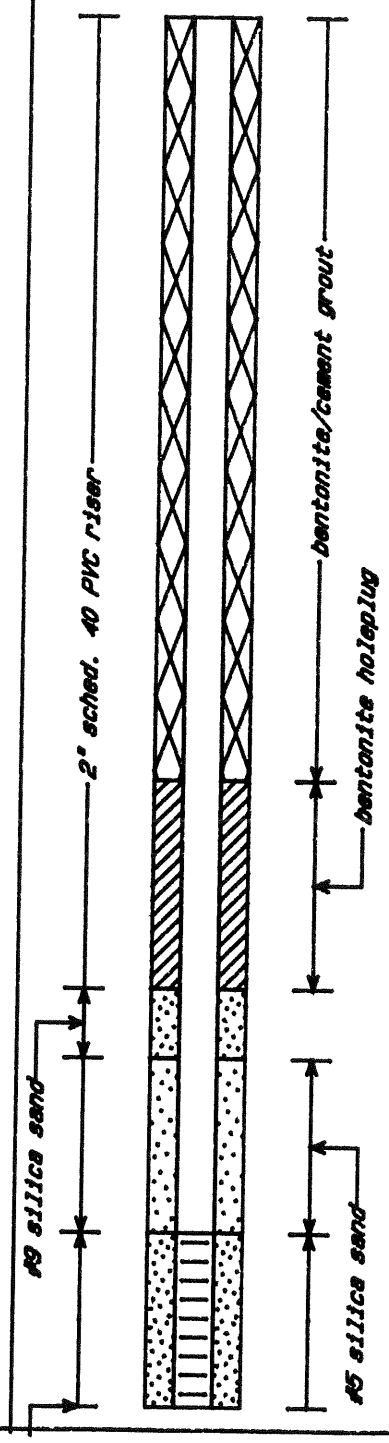
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4					
1	2" sched. 40 PVC riser; cement; bentonite/cement grout		4 4 6 4		0.0'-10.0' Brown, mottled gray, silty CLAY, trace fine sand. Stiff, becomes very stiff @ 4.0'
			1 4 8 10		
			2 7 11 7		
6					STATIC WATER LEVEL @ 5.56' Measured on 8/17/94
			3 7 11 14		
			2 7 11 13		
11			2 5 9 12		10.0'-16.0' Brown, mottled gray CLAY, less silt, trace fine sand. Stiff.
			2 4 6 8		
			2 5 8 7		
16			2 5 7 10		16.0'-20.0' Brown, mottled gray CLAY, trace silt, Medium stiff.
			3 4 8 8		

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

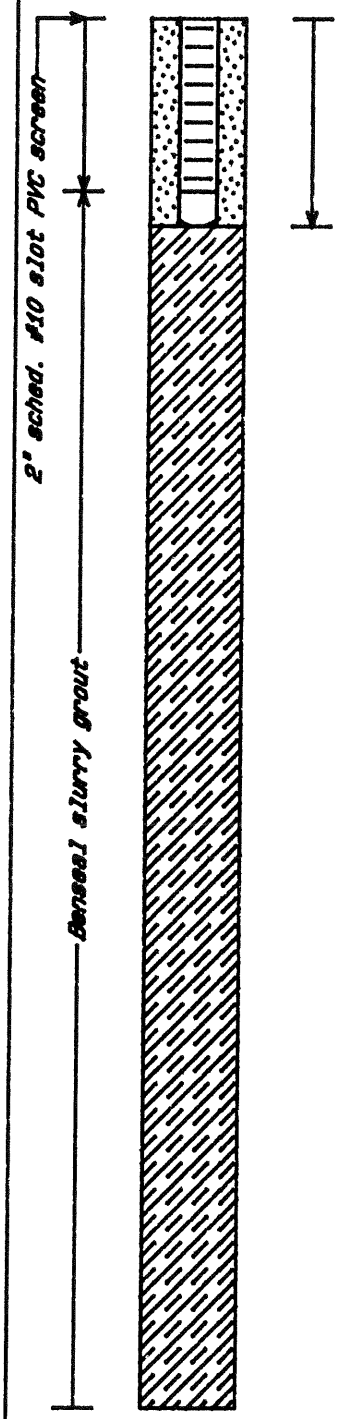
Hole/Well No. DB-5 (2 of 5)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 43 feet
Date Started 7/13/94
Date Completed 7/13/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
20			1 3 3 5		20.0'-22.0' Gray CLAY, trace fine sand, occasional coarse sand to fine gravel. Soft.
			1 3 5 4		22.0'-26.0' Gray CLAY, occasional coarse sand to fine gravel. Soft.
25			1 2 4 6		
			1 3 3 5		26.0'-29.4' Gray CLAY. Soft.
			2 4 6 8		29.4'-29.8' Fine to very fine SAND, some silt. Wet.
30			3 6 5 5		29.8'-30.3' Gray CLAY. Soft.
					30.3'-32.0' SILT, trace clay. Medium compact. Moist to very moist.
			3 6 5 2		32.0'-33.7' SILT. Medium compact. Moist to very moist.
					33.7'-35.0' Gray CLAY. Soft.
35			2 4 6 4		Water came up to 34.6'
					35.0'-36.0' Gray CLAY. Soft.
					36.0'-36.8' SILT, occasional clay stringers, < 1" thick.
			1 3 3 5		36.8'-38.7' Gray CLAY. Soft.
			2 4 6 10		38.7'-38.9' 2" fine SAND and SILT seam Wet.
40					38.9'-40.0' Gray CLAY. Soft.



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-5 (3 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	43 feet
Geologist/Engineer	BEG	Date Started	7/13/94
Drill Agency	Stearns	Date Completed	7/13/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
40			1 3 3 10		40.0'-40.6' Gray SILT. Compact. Very moist. [SOIL TEST: SP-POORLY GRADED SAND] 40.6'-42.2' Fine to very fine SAND, little silt. Wet.
			3 7 12 13		42.2'-43.0' Gray CLAY with silt seams. Soft. Moist. 43.0'-44.4' SILT, trace clay. Medium compact. Moist to very moist.
45			6 3 6 7		44.4'-63.0' Gray CLAY, trace silt, occasional fine gravel to coarse sand. Medium stiff. NOTE: Piezometer was installed offset from original borehole.
			2 6 7 10		
			2 5 8 9		
50					50.0'-52.0' Shelby Tube Sample. No recovery.
					53.0'-55.0' Shelby Tube Sample. 500 psi. [SOIL TEST: CL-LEAN CLAY WITH SAND]
55					
			3 7 8 15		
60					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-5 (4 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	43 feet
Geologist/Engineer	BEG	Date Started	7/13/94
Drill Agency	Stearns	Date Completed	7/13/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
60	Bentonite slurry grout				
		X	3 6 10 12		63.0'-73.0' Gray CLAY, trace silt, occasional coarse sand to fine gravel. Stiff.
65					
		X	3 7 9 11		
70					
		X	1 4 5 6		73.0'-78.0' Gray CLAY. Medium stiff.
75					
		X	3 8 12 14		78.0'-88.0' Gray, silty CLAY, trace fine sand, occasional fine gravel to coarse sand.
80					

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-5 (5 of 5)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 43 feet
Date Started 7/13/94
Date Completed 7/13/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
80	Benseal slurry grout				
		X	6 10 16 17		
85					
		X	5 12 13 17		88.0'-98.0' Gray CLAY, trace silt and fine sand, occasional fine gravel to coarse sand, some sandstone and coarse gravel. Stiff.
90					
		X	4 8 12 13		
95					
		X	4 7 9 12		98.0'-100.0' Gray CLAY, occasional coarse sand to fine gravel. Stiff.
100					

EOB @ 100.0'

TOC ELEVATION = 678.57'
GROUND ELEVATION = 675.5'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-6
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG, WJB	Date Started	7/14/94
Drill Agency	Stearns	Date Completed	7/14/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0	Bensenal slurry grout		2 3 5 6		0.0'-4.0' Brown mottled CLAY, some silt. Dry.
1					
2			4 5 6 10		
3					
4			3 6 10 13		4.0'-6.0' Brown mottled CLAY, some silt. Stiff. Dry.
5					
6			3 7 11 12		6.0'-8.0' Brown mottled CLAY, trace coarse sand. Stiff. Dry.
7					
8			2 6 8 11		8.0'-10.0' Brown mottled CLAY. Stiff. Dry.
9					
10			3 5 9 12		10.0'-14.0' Brown mottled CLAY, some silt. Stiff. Dry/moist.
11					
12			3 4 7 8		
13					
14			3 6 9 12		14.0'-16.0' Brown/gray CLAY, some silt and coarse sand. Stiff. Dry.
15					
16			2 5 7 10		16.0'-20.0' Brown/gray CLAY, trace silt, vertical gray strip of silty clay. Stiff. Dry to moist.
17					
18			3 4 7 8		
19					
20			2 4 8 10		20.0'-22.0' Brown/gray CLAY, some silt, occasional coarse sand. Stiff. Dry to moist.
21					
22			3 4 7 10		22.0'-25.0' Brown/gray CLAY, trace coarse sand to fine gravel. Stiff. Dry to moist.
23					
24			2 4 7 8		
25					25.0'-26.0' Gray mottled CLAY, trace coarse sand. Stiff. Dry.
26					

DELL ENGINEERING, INC.

Project: Laidlaw
Location: Ottawa County Farms Landfill
Job No.: 940387
Geologist/Engineer: BEG, WJB
Drill Agency: Stearns

Hole/Well No.: DB-6
Diameter of Drill Hole: 4.25" ID HSA
Total Depth of Hole: 100 feet
Date Started: 7/14/94
Date Completed: 7/14/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	Bensseal slurry grout		3 5 9 12		26.0'-28.0' Brown/gray CLAY, occasional coarse sand to fine gravel. Stiff. Dry to moist.
27					
28			3 5 6 7		28.0'-30.0' Brown/gray CLAY, occasional coarse sand. Stiff. Dry to moist.
29					
30			1 3 5 5		30.0'-38.0' Gray CLAY, occasional coarse sand. Medium stiff. Dry/moist.
31					
32			2 4 7 8		
33					
34			2 4 5 6		
35					
36			2 3 5 5		
37					
38			2 2 4 4		38.0'-42.5' Gray CLAY. Medium stiff. Moist.
39					
40			1 4 4 6		
41					
42			3 3 7 8		42.5'-44.0' Gray CLAY, occasional coarse sand. < 1" seam of light brown, silty, fine sand. Moist.
43					
44			2 4 7 8		44.0'-46.0' Gray CLAY, occasional coarse sand, few < .25" pieces of sandstone. Moist.
45					
46			2 5 8 7		46.0'-48.0' Gray CLAY, occasional coarse sand and gravel. Moist.
47					
48			2 5 7 9		48.0'-53.0' Gray CLAY, occasional coarse sand. Medium stiff to stiff. Moist to dry.
49					
50					
51					
52					

DELL ENGINEERING, INC.

Project: Laidlaw
Location: Ottawa County Farms Landfill
Job No.: 940387
Geologist/Engineer: BEG, WJB
Drill Agency: Stearns

Hole/Well No.: DB-6
Diameter of Drill Hole: 4.25" ID HSA
Total Depth of Hole: 100 feet
Date Started: 7/14/94
Date Completed: 7/14/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	Bensseal slurry grout				
53		X	3 5 8 8		53.0'-58.0' Gray CLAY, with occasional pieces of sandstone (<.5"). Stiff. Moist to Dry.
54					
55					
56					
57					
58		X	4 7 8 11		58.0'-63.0' Gray CLAY. Stiff. Dry to moist.
59					
60					
61					
62					
63		X	2 3 6 9		63.0'-68.0' Gray CLAY with occasional coarse sand to fine gravel. Dry to moist. 3" seam of wet, sandy clay with some silt @ 64'.
64					
65					
66					
67					
68		X	2 4 5 6		68.0'-73.0' Gray CLAY, trace coarse sand. Medium stiff to stiff. Moist.
69					
70		X			70.0'-72.0' Shelby Tube Sample.
71					
72					
73		X	1 3 4 4		73.0'-78.0' Gray CLAY, some coarse sand to fine gravel. Medium stiff. Moist.
74					
75					
76					
77					
78					

DELL ENGINEERING, INC.

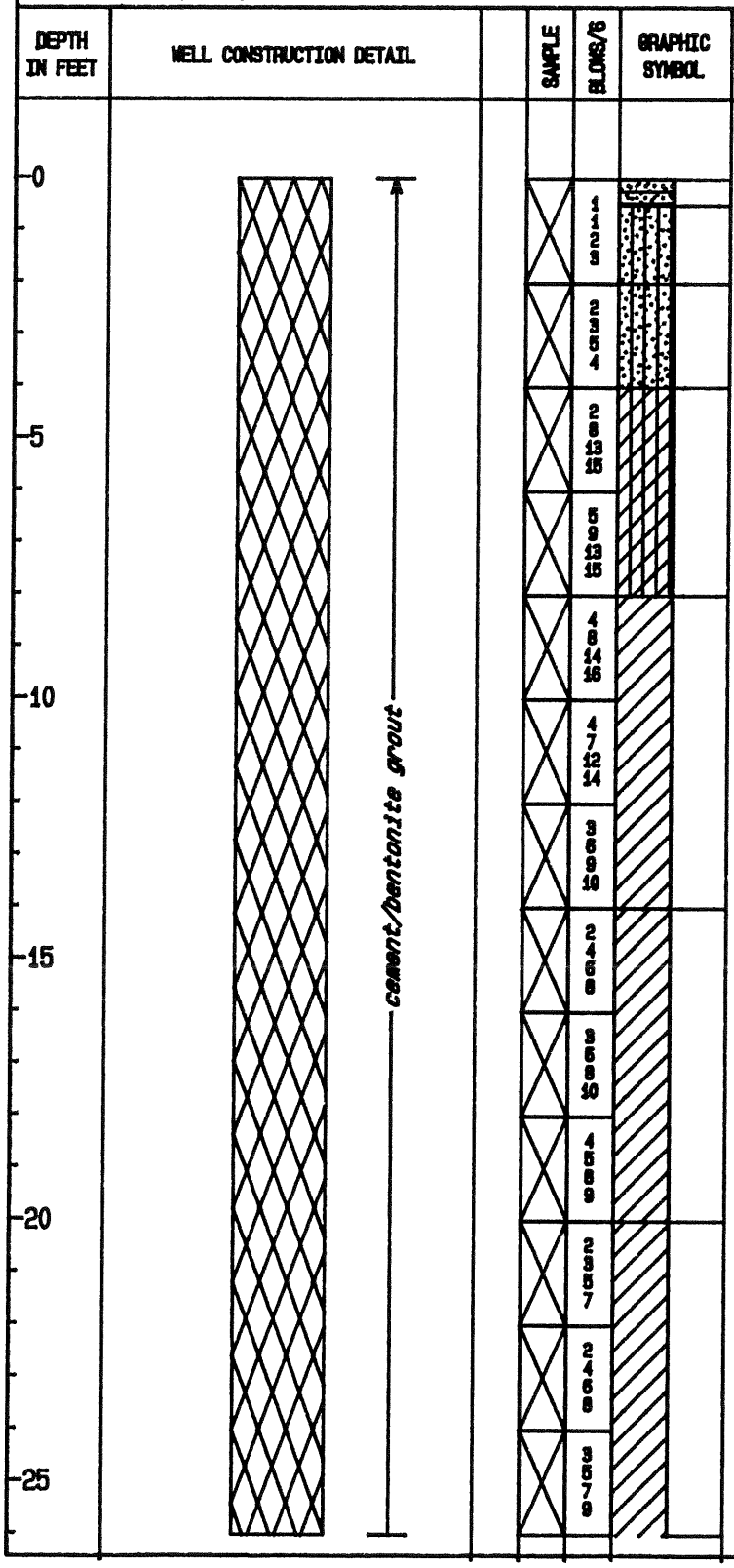
Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

Hole/Well No. DB-6
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 100 feet
Date Started 7/14/94
Date Completed 7/14/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	Bensenal slurry grout				78.0'-93.0' Gray CLAY, some coarse sand to fine gravel. Stiff. Dry to moist.
79		X	3 7 11 14		
80					
81					
82					
83		X	4 9 13 16		
84					
85					
86					
87					
88		X	3 7 11 12		
89					
90					
91					
92					
93		X	3 8 11 14		93.0'-100.0' Gray CLAY, trace coarse sand. Stiff. Dry to moist.
94					
95					
96					
97					
98		X	2 6 8 11		
99					
100					EOB @ 100.0'.
101					
102					
103					
104					

DELL ENGINEERING, INC.

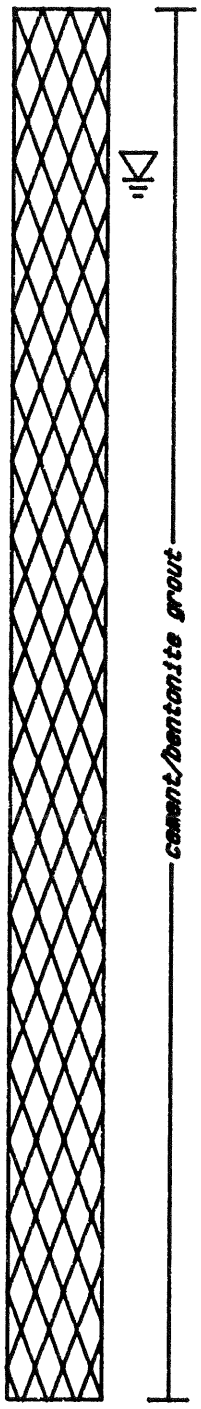
Project	Laidlaw	Hole/Well No.	DB-7 (1 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/06/94



0.0'-0.5'	Sandy TOPSOIL. Moist.
0.5'-2.0'	Orangish-brown, silty, fine to medium SAND. Moist.
2.0'-4.0'	Orangish-brown, silty, fine to medium SAND. Moist to wet.
4.0'-8.0'	Brown mottled gray, silty CLAY, occasional fine gravel. Very stiff.
8.0'-14.0'	Brown CLAY, little silt, occasional fine gravel. Very stiff to stiff.
14.0'-20.0'	Brown CLAY, trace silt, occasional fine gravel. Medium stiff.
20.0'-36.0'	Gray/brown CLAY, trace silt, occasional coarse sand to fine gravel. Medium stiff.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-7 (2 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/05/94
Drill Agency	Stearns	Date Completed	7/06/94

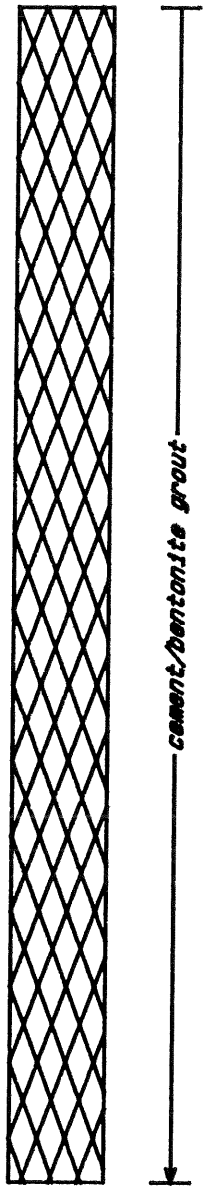
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26			2 5 6 6		
			3 5 7 8		
31			2 4 6 8		
			2 4 5 6		
			2 3 4 5		
36			1 3 6 6		36.0'-38.0' Gray/brown CLAY, trace silt, occasional coarse sand to fine gravel. Medium stiff. Moist to very moist.
			1 3 3 3		38.0'-38.3' Very fine to fine SAND. Wet. 38.3'-40.0' Gray CLAY. Soft. Moist.
41			3 5 7 7		40.0'-40.5' Brown/gray CLAY and very fine to fine SAND. Wet. Water Level = 29.2' 40.5'-44.0' Gray CLAY. Medium stiff. Moist.
			2 5 6 6		
			2 4 4 4		44.0'-46.0' Gray CLAY, trace fine sand. Soft. Moist.
46			1 8 20 11		46.0'-48.0' Brown/gray CLAY, trace fine sand. (pushed gray sandstone cobble) Moist.
			7 7 10 10		48.0'-53.0' Brown/gray CLAY, trace fine sand. (more sandstone) Moist.
51					

cement/bentonite grout

DELL ENGINEERING, INC.

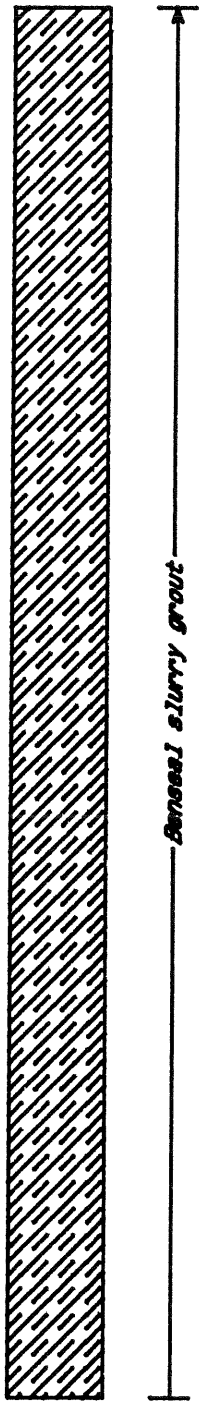
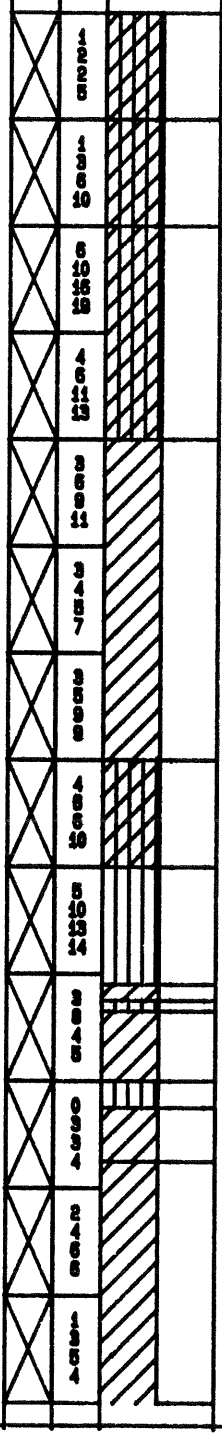
Project Laidlaw	Hole/Well No. DB-7 (4 of 4)
Location Ottawa County Farms Landfill	Diameter of Drill Hole 4.25" ID HSA
Job No. 940387	Total Depth of Hole 100 feet
Geologist/Engineer BEG	Date Started 7/05/94
Drill Agency Stearns	Date Completed 7/06/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78			3 6 10 11		
83			5 12 16 18		
					86.0'-88.0' Shelby Tube Sample. (Poor recovery)
88					88.0'-90.0' Shelby Tube Sample. 500 psi [SOIL TEST: CL-LEAN CLAY WITH SAND]
93			7 13 19 23		
98			5 10 15 15		EOB @ 100.0'.
103					



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-8 (1 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/07/94
Drill Agency	Stearns	Date Completed	7/07/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0					0.0'-2.0' Red-brown, silty CLAY with some natural organics. Soft. Wet.
					2.0'-4.0' Brown mottled gray, silty CLAY. Medium stiff.
5					4.0'-8.0' Brown mottled gray silty CLAY. Very stiff.
					8.0'-14.0' Brown CLAY with occasional gray mottling, little silt. Medium stiff.
10					
15					14.0'-16.0' Gray/brown, silty CLAY. Medium stiff. Moist.
					16.0'-18.2' Brown SILT. Medium compact. Very moist.
					18.2'-18.5' Gray CLAY. Soft.
					18.5'-18.7' Brown SILT. Medium compact. Very moist.
20					18.7'-20.0' Gray CLAY. Soft.
					20.0'-20.5' SILT, some fine sand. Very soft. Wet.
					20.5'-21.5' Brown/gray CLAY and SAND, some silt. Soft. Wet.
					21.5'-44.3' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff.
25					

Bentonite slurry grout

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-8 (2 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/07/94
Drill Agency	Stearns	Date Completed	7/07/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	Benseal slurry grout		2 2 4 5		
31			2 3 4 6		
			2 4 6 7		
			3 6 9 8		
36			2 4 6 8		
			3 6 9 9		
41			3 5 7 9		
			3 5 7 8		
			2 3 4 6		44.3'-47.0' Gray clay. Medium stiff.
46			1 4 5 5		47.0'-50.0' Gray CLAY and fine SAND, occasional coarse sand to fine gravel. Medium stiff. Moist.
			3 4 6 7		50.0'-53.0' Gray, fine sandy CLAY, occasinal coarse sand to fine gravel. Medium stiff.
51					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-8 (3 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/07/94
Drill Agency	Stearns	Date Completed	7/07/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	Benseal slurry grout				
		X	2 5 9 10		53.0'-63.0' Gray CLAY, trace fine sand, occasional coarse sand to fine gravel. Medium stiff.
57		X	3 6 10 12		
62		X	4 6 10 13		63.0'-88.0' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff.
67		X	3 8 11 14		
72		X	3 5 7 9		
77					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-8 (4 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/07/94
Drill Agency	Stearns	Date Completed	7/07/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	Bensenal slurry grout	X	3 5 8 8		
83		X	3 6 6 9		
88		X	3 6 7 10		88.0'-100.0' Gray CLAY, trace silt, occasional coarse sand to fine gravel. Medium stiff.
93		X	5 9 13 15		
98		X	7 11 19 22		EOB @ 100.0'.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-9
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/18/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0	Bensseal slurry grout		6 6 8 8		0.0'-2.0' Silty CLAY, some sand, occasional fine gravel. (roadway)
1					
2			5 3 4 6		2.0'-12.0' Brown mottled gray, silty CLAY, trace fine sand. Stiff.
3					
4			3 5 9 11		
5					
6			4 6 10 13		
7					
8			6 6 10 12		
9					
10			2 6 8 10		
11					
12			2 2 4 6		12.0'-24.0' Gray CLAY, occasional coarse sand to fine gravel. Soft.
13					
14			1 2 4 5		
15					
16			1 3 5 5		
17					
18			2 5 5 6		
19					
20			1 3 5 6		
21					
22					22.0'-24.0' Shelby Tube Sample.
23					
24			1 3 6 8		24.0'-30.0' Gray/brown CLAY, little silt, occasional coarse sand to fine gravel. Medium stiff.
25					
26					

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-9
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 100 feet
Date Started 7/18/94
Date Completed 7/18/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
26	Bensseal slurry grout		2 4 7 8		
27					
28			2 4 5 7		
29					
30			1 3 5 8		30.0'-35.0' Gray/brown CLAY, trace silt, occasional coarse sand to fine gravel. Medium stiff.
31					
32			2 3 6 5		
33					
34			2 7 5 7		
35					35.0'-36.5' Gray. silty CLAY. Compact. Wet.
36			2 3 6 8		36.5'-38.0' Gray, silty CLAY. Medium stiff. Moist.
37					
38			2 4 7 10		38.0'-46.0' Gray CLAY, trace silt, occasional coarse sand to fine gravel. Medium stiff.
39					
40			2 4 6 8		
41					
42			3 5 6 9		
43					
44			2 3 6 4		
45					
46			1 2 2 3		46.0'-58.0' Gray CLAY, occasional coarse sand to fine gravel. Soft.
47					
48			1 2 3 4		
49					
50					
51					
52					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-9
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG	Date Started	7/18/94
Drill Agency	Stearns	Date Completed	7/18/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52	Bensseal slurry grout				
53					
54		X	2 3 5 7		
55					
56					
57					
58					58.0'-63.0' Gray CLAY, occasional coarse sand to fine gravel, trace fine sand. Fine sand seam @ 59.5 (<1" thick).
59		X	3 5 7 7		
60					
61					
62					
63					63.0'-68.0' Gray CLAY, trace silt. Medium stiff.
64		X	2 5 6 8		
65					
66					
67					
68					68.0'-78.0' Gray/brown CLAY. Medium stiff.
69		X	3 4 8 10		
70					
71					
72					
73					
74		X	2 4 7 9		
75					
76					
77					
78					

DELL ENGINEERING, INC.

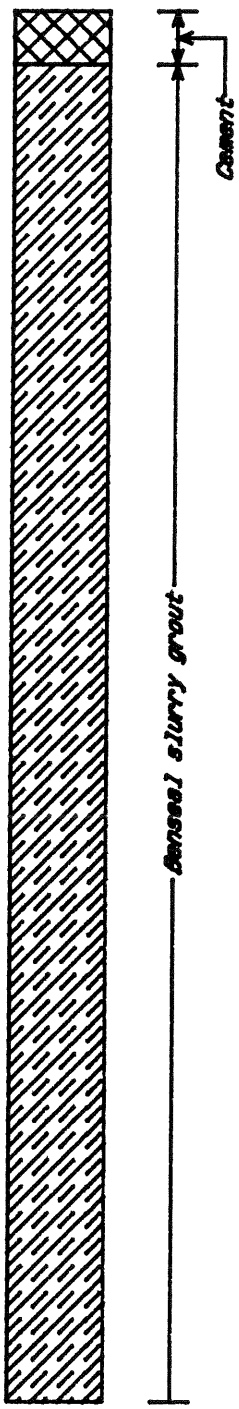
Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-9
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 100 feet
Date Started 7/18/94
Date Completed 7/18/94

DEPTH IN FEET	BORING BACKFILL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	Benseal slurry grout				
79		X	3 8 11 15		78.0'-83.0' Gray/brown silty CLAY, trace fine sand, occasional fine gravel to coarse sand. Stiff.
80					
81					
82					
83					
84		X	5 8 13 15		83.0'-98.0' Gray, silty CLAY, trace fine sand, occasional coarse sand to fine gravel. Stiff.
85					
86					
87					
88					
89		X	4 7 11 15		
90					
91					
92					
93					
94		X	4 8 14 14		
95					
96					
97					
98					
99		X	3 5 8 10		98.0'-100.0' Gray CLAY, trace fine sand, trace silt, occasional coarse sand to fine gravel. Medium stiff.
100					EOB @ 100.0'
101					
102					
103					
104					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-10 (1 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG, WJB	Date Started	7/19/94
Drill Agency	Stearns	Date Completed	7/20/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0			2 3 3 3		0.0'-1.0' Light brown, fine SAND. Dry.
					1.0'-2.0' Brown, silty CLAY. Dry to moist.
			3 3 4 6		2.0'-12.0' Brown mottled gray, silty CLAY. Stiff.
5			3 6 11 15		
			3 6 10 13		
			3 5 9 11		
10			4 7 9 11		
			1 5 7 10		12.0'-16.2' Brown, silty CLAY. Stiff.
15			3 5 8 10		
			2 2 5 5		16.2'-26.0' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff.
			1 3 5 7		
20			1 3 5 6		
			2 3 5 6		
25			3 3 5 5		

Cement

Bensenal slurry grout

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG, WJB
Drill Agency Stearns

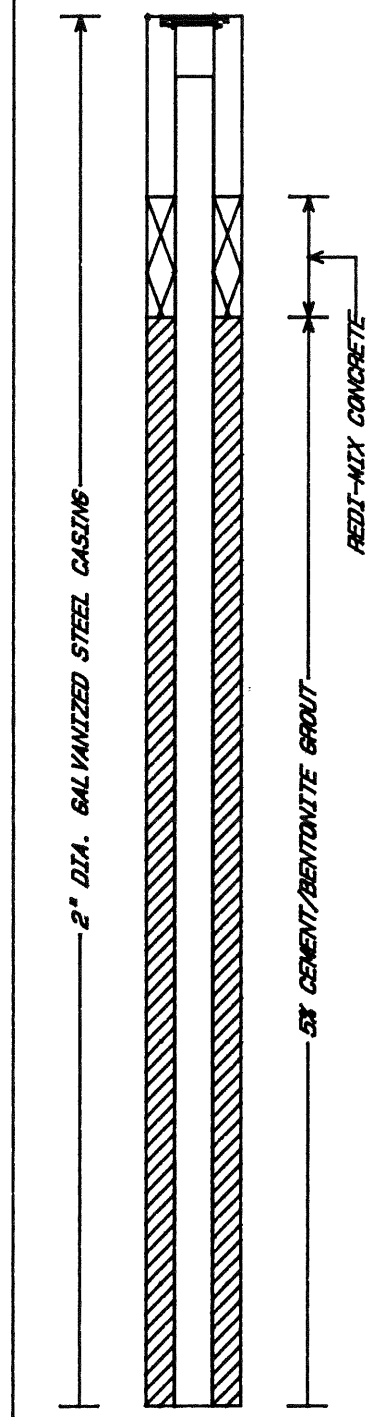
Hole/Well No. DB-10 (4 of 4)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 100 feet
Date Started 7/19/94
Date Completed 7/20/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
78	Bensenal slurry grout	X	5 9 14 15		78.0'-83.0' Gray, fine CLAY, little silt, occasional fine gravel. Compact
83		X	4 6 11 13		83.0'-88.0' Gray, fine, sandy CLAY, little silt, occasional fine gravel. Compact.
88		X	4 7 11 15		88.0'-93.0' Gray CLAY, trace fine silt, trace fine sand, occasional coarse sand to fine gravel. Stiff.
93		X	3 6 9 9		93.0'-100.0' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff.
98		X	3 6 10 13		EOB @ 100.0'
103					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (1 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
3					
			0 1 1 1		0.0'-2.3' Brown, silty CLAY, some sand. (Till)
2			2 3 4 6		2.3'-5.5' Brown, fine SAND, occasional silty clay seams (< 2" thick). Moist.
			2 3 5 3		5.5'-9.0' Brown, mottled gray, silty CLAY. Medium stiff.
7			2 4 7 9		
			3 5 7 10		9.0'-10.2' Gray/brown silty SAND, little clay, occasional fine gravel Medium stiff. Moist.
			4 3 5 4		10.2'-11.5' Gray/brown sandy CLAY, trace fine gravel. Soft.
12			3 4 6 9		
			5 5 6 10		
			3 7 8 10		11.5'-33.5' Gray CLAY, trace fine silt, occasional coarse sand to fine gravel. Stiff.
17			2 4 6 7		



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (2 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
20	2" DIA. GALVANIZED STEEL CASING; 5% CEMENT/BENTONITE GROUT		2 4 5 7		
			1 4 5 7		20.0'-33.5' Gray CLAY, occasional medium to fine gravel. Medium stiff.
25			2 3 5 6		STATIC WATER ELEVATION = 624.54' Measured on 8/17/94
			3 5 5 6		
			2 4 5 6		
30			2 3 6 6		
			4 5 7 7		SILTY SAND SEAM AT 32.2' < 1"
					33.5'-45.5' Gray/brown CLAY. Medium stiff.
35			2 3 4 5		
			2 3 3 4		
			1 3 4 4		
40					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (3 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
40	2" DIA. GALVANIZED STEEL CASING; 6" CEMENT/BENTONITE GROUT		2 3 4 5		
			1 3 3 5		
45			2 3 3 5		45.5'-61.0' Gray/brown CLAY, trace fine sand. Medium stiff.
			1 3 4 5		
50			2 3 5 7		
55			4 8 11 11		
60			4 8 10 15		
			8 11 17 24		61.0'-63.0' Gray CLAY, little sand, occasional medium sand to coarse gravel. Stiff. (Pushed a rock-poor recovery)
65			3 8 11 14		63.0-70.0' Gray CLAY, trace of sand and silt, occasional medium sand to fine gravel. Stiff.

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-11 (4 OF 10)
Diameter of Drill Hole 9"
Total Depth of Hole 190 feet
Date Started 8-3-94
Date Completed 8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
65	2" DIA. GALVANIZED STEEL CASING; 6% CEMENT/BENTONITE GROUT		6 8 11 12		
			6 7 9 9		
70			5 8 10 10		70.0'-72.0' Gray CLAY. Stiff.
			2 4 5 6		72.0'-73.2' Gray, fine, sandy CLAY, occasional fine gravel. Medium stiff.
			7 9 9 9		73.2'-75.0' Fine, sandy CLAY, little fine gravel. Soft. Moist.
75			5 10 19 23		75.0'-77.0' Brown/gray, silty CLAY, occasional fine gravel. Very stiff. Dry
			9 13 15 18		77.0'-84.0' Gray/brown, silty CLAY, occasional fine coarse gravel, trace fine sand. Very Stiff. Dry.
80			4 11 17 18		
			6 11 12 13		
			4 5 9 12		84.0'-85.0' Gray, sandy CLAY, occasional fine to coarse gravel. Medium stiff.
85			12 18 21 12		85.0'-85.5' Fine to medium SAND, trace coarse sand. Dense. Wet. (W.L. = 70.0')
			40 50/6"		85.5'-89.0' Gray, sandy SILT, some clay, occasional fine gravel to coarse sand. Very stiff. Moist.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (6 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
104	2" #7 SLOT CNW SS SCREEN; BENSEAL SLURRY GROUT		26 100/5"		NOTE: Borehole for well installation was drilled approximately 10' offset from initial borehole which was grouted.
109			17 45 50/3"		109.5'-113.0' Brown, fine to medium SAND, trace coarse sand and silt. Very Dense. Wet.
114			18 50/5"		113.0'-117.0' Gray SILT, little fine sand. Very dense. Moist to dry.
119			31 50/3"		117.0'-120.0' Gray SILT and fine to coarse SAND. trace fine gravel. Very compact. Moist.
124					120.0'-127.0' Brown/gray, fine, silty SAND, some clay, trace medium to coarse sand. Very dense. Moist to very moist.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (7 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
124	BENSEAL SLURRY GROUT		23 77 - -		[SOIL TEST: SC-SM - CLAYEY SILTY SAND]
					127.0'-132.0' Silty CLAY, some fine sand, occasional coarse sand to fine gravel. Very stiff. (Till)
129			31 38 68 50/3"		
					132.0'-134.3' Gray/brown SILT and fine to very fine SAND. Very dense. Moist.
134			170/5.5"		134.3'-137.2' Silty CLAY, some fine sand and coarse to fine gravel. Very stiff. Moist.
					137.2'-139.6' Brown, fine SAND, trace medium sand. Wet.
139			18 60 - -		139.6'-142.0' Fine to coarse SAND and GRAVEL. Wet.
					142.0'-147.0' Fine to coarse, clayey SAND and GRAVEL, some silt. Very dense. Dry. (Till)
144			10 110/5"		

DELL ENGINEERING, INC.

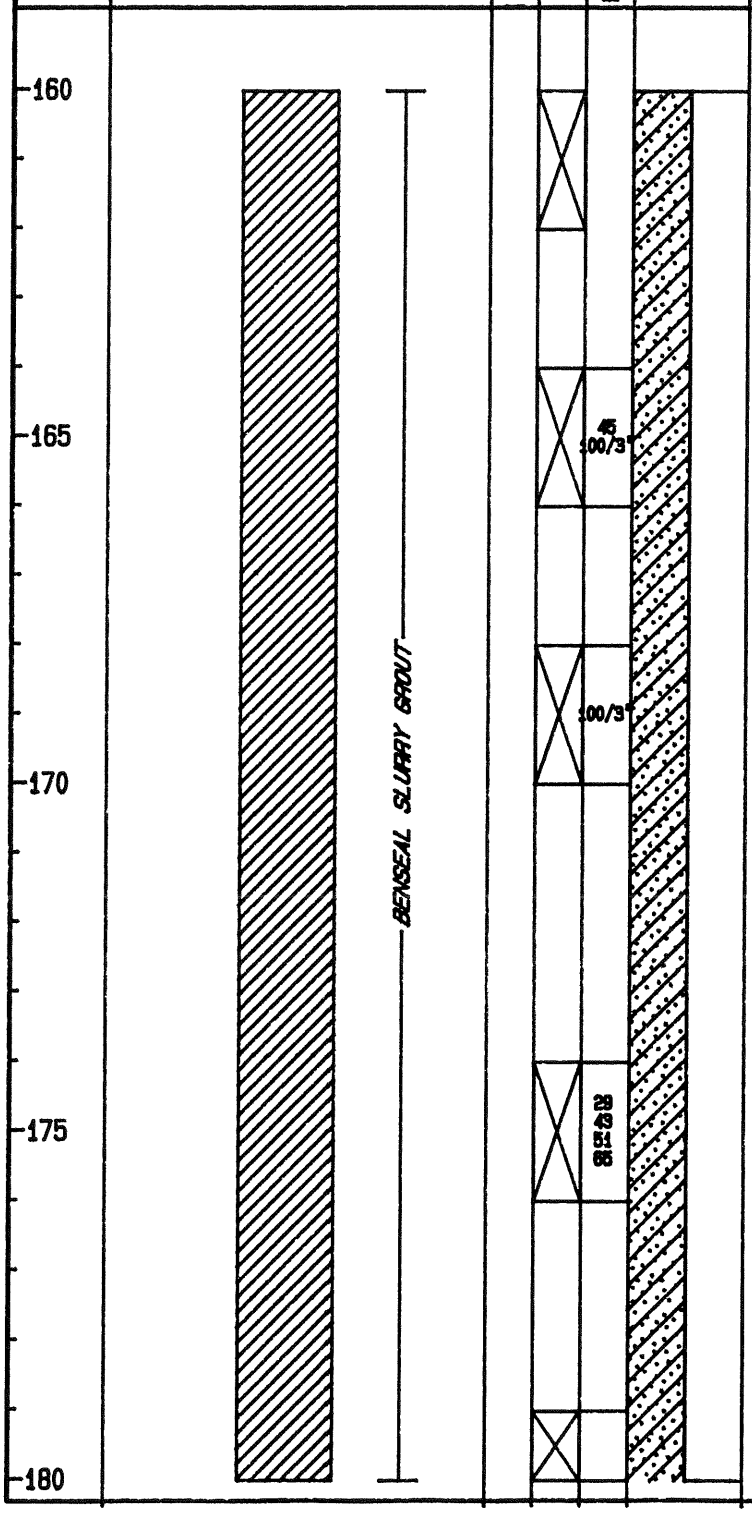
Project	Laidlaw	Hole/Well No.	DB-11 (8 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
147	BENSEAL SLURRY GROUT				147.0'-153.0' Clayey SILT, trace fine sand, occasional coarse sand to fine gravel. Very stiff. Dry. (Till)
			24 68 90/3"		
152					153.0'-154.5' Gray SILT, trace clay. Stiff. Moist.
			31 - 68 - -		154.5'-156.0' Fine to coarse GRAVEL and SAND, trace silt. Wet.
			46 100/4"		156.0'-157.8' Gray SILT, some sand and gravel, little clay. Stiff. Moist.
157					157.8'-159.2' Brown, fine SAND. Wet.
			15 35 - 68 - 27 63 87/2"		159.2'-160.0' Fine, sandy CLAY, some silt, little fine to coarse gravel. Very dense. Dry.

DELL ENGINEERING, INC.

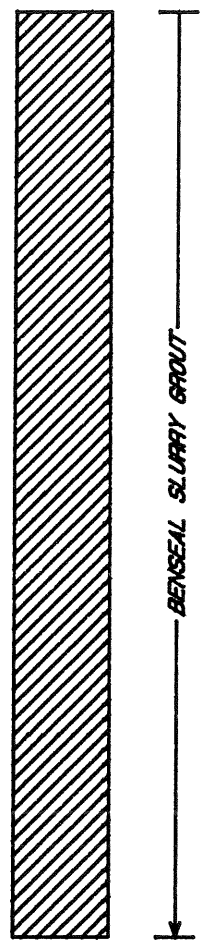
Project	Laidlaw	Hole/Well No.	DB-11 (9 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
160					160.0'-181.0' Fine, sandy CLAY, some silt, little fine to coarse gravel. Very stiff. Dry. (Till) [SOIL TEST: SC-CLAYEY SAND]
165			45 100/3"		
			100/3"		
170					
175			29 43 51 65		
180					



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-11 (10 OF 10)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	190 feet
Geologist/Engineer	BEG	Date Started	8-3-94
Drill Agency	Stearns	Date Completed	8-15-94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
180			19 29 36 52		
					181.0'-183.0' Gray, silty CLAY. Stiff.
					183.0'-187.0' Gray, fine, silty SAND, some clay. Very dense. Moist.
185			16 31 70 50/2"		
					187.0'-189.4' Gravelly CLAY, some sand. Hard.
190			69 50/1"		189.4'-190.0' Greenish-gray LIMESTONE EOB @ 189.6'. OFFSET APPROXIMATELY 10' WEST TO SET A WELL. TOP OF CASING ELEVATION @ 652.92' GROUND SURFACE ELEVATION @ 650.3'
195					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-12 (1 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/22/94
Drill Agency	Stearns	Date Completed	7/22/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0	BENSEAL SLURRY		1 2 4 4		0.0'-3.0' Brown to dark brown, sandy CLAY. Fill (Roadway).
2			2 2 3 4		3.0'-8.0' Brown, mottled gray, silty CLAY.
4			3 4 8 11		
6			3 6 6 10		Approximately 3" Seam of Silty Fine Sand. Wet.
8			2 4 5 6		8.0'-10.0' Brown, mottled gray, silty CLAY with lenses (< 1") of medium sand. Wet.
10			2 5 5 5		10.0'-11.5' Gray, clayey SILT. Moist.
					11.5'-12.0' Gray, silty CLAY.
12			1 2 3 3		12.0'-16.0' Gray CLAY with some silt. Soft.
14			1 3 4 6		
16			2 1 3 4		16.0'-18.0' Gray CLAY with occasional medium to coarse sand.
18			2 3 5 6		18.0'-20.0' Gray CLAY with occasional coarse sand.
20					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-12 (2 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/MJB	Date Started	7/22/94
Drill Agency	Stearns	Date Completed	7/22/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION	
20	BENSEAL SLURRY		2 3 6 7		20.0'-24.0'	Gray CLAY with occasional medium to coarse sand.
22			1 3 4 5			
24			1 2 3 3		24.0'-28.0'	Gray CLAY with occasional medium to coarse sand. Soft.
26			1 2 3 4			
28			1 3 3 5		28.0'-36.0'	Gray CLAY with occasional coarse sand. Soft.
30			1 3 4 4			
32			1 3 3 4			
34			1 2 4 5			
36			2 3 5 7		36.0'-40.0'	Gray CLAY with occasional coarse sand. Medium stiff.
38			2 3 6 7			
40						

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-12 (3 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/22/94
Drill Agency	Stearns	Date Completed	7/22/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
40	BENSEAL SLURRY				40.0'-44.0' Gray CLAY with occasional coarse sand to fine gravel. Stiff.
42			7 blows		Shelby Tube, 42'-44'. 400 psi @ end. Full Recovery
44					44.0'-48.0' Gray CLAY. Medium stiff.
46					
48			4-4-5-1		48.0'-53.0' Gray CLAY with occasional medium to coarse sand. Soft.
50					
52					
54			7 blows		53.0'-58.0' Gray, fine, sandy CLAY, trace silt.
56					
58			12 blows		58.0'-63.0' Gray, fine, sandy CLAY with occasional fine gravel, trace silt.
60					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-12 (4 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/22/94
Drill Agency	Stearns	Date Completed	7/22/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
60					
62					
64	BENSEAL SLURRY	X	3 8 12		63.0'-73.0' Gray, fine, sandy CLAY with occasional coarse sand to fine gravel, trace silt. Stiff.
66					
68		X	8 10 14		
70					
72					
74		X	3 7 13 13		73.0'-83.0' Gray, fine, sandy CLAY with occasional coarse sand, trace silt. Stiff.
76					
78		X	8 8 12 14		
80					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-12 (5 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/22/94
Drill Agency	Stearns	Date Completed	7/22/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
80					
82					
84			5 9 13 16		83.0'-88.0' Gray CLAY with occasional coarse sand to fine gravel, trace fine sand. Stiff.
86					
88			5 4 8 9		88.0'-93.0' Gray CLAY, with occasional coarse sand, trace fine sand. Medium stiff.
90	BENSEAL SLURRY				
92					
94			16 17 18 16		93.0'-94.2' Gray SILT. Hard. 94.2'-98.0' Gray CLAY, trace silt. Stiff.
96					
98			5 8 8 13		98.0'-100.0' Gray CLAY with few pieces of sandstone, trace silt. Stiff.
100					Ground Surface Elevation @ 654.19'
102					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-13 (1 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/20/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
0	BENSEAL SLURRY		4 3 4 6		0.0'-1.0' Dark brown TOPSOIL, silty and clayey.
			4 4 9 10		1.0'-6.0' Brown, mottled gray, silty CLAY, trace fine sand. Stiff.
5			3 6 12 14		
			3 5 7 9		6.0'-9.5' Brown, mottled gray, silty CLAY, trace fine sand. Medium stiff.
			3 7 9 10		2" Silt Seam @ 9.5'
10			2 4 5 7		10.0'-15.5' Brown CLAY, trace silt. Soft.
			1 3 3 4		
15			1 2 4 4		15.5'-17.7' Gray CLAY, occasional coarse sand, trace fine sand. Soft.
			1 3 3 4		17.7'-20.0' Gray, fine, sandy CLAY. Soft.
20			3 5 6 7		

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-13 (2 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/20/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
20	BENSEAL SLURRY		2 4 7 9		20.0'-20.8' Gray, fine, sandy CLAY. Medium stiff.
					20.8'-26.0' Gray CLAY, occasional coarse sand, trace silt.
			2 4 6 8		
25			3 5 6 7		
			2 3 4 6		26.0'-36.0' Gray CLAY, occasional coarse sand to fine gravel. Soft.
			1 4 7 7		
30			2 4 5 7		
			3 4 7 7		
35			2 4 6 7		
			2 5 5 7		36.0'-59.0' Gray CLAY, occasional coarse sand to fine gravel. Soft.
			2 2 4 6		
40					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-13 (3 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/20/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
40	BENSEAL SLURRY	X	2 4 5 6		
		X	2 4 6 7		
45		X	2 3 6 6		
		X	0 3 5 6		
		X	2 5 5 6		
50					
		X	2 3 5 6		
55					
		X	2 4 6 7		59.0'-68.0' Gray CLAY, occasional coarse sand, trace fine sand. Medium stiff.
60					

DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-13 (4 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	100 feet
Geologist/Engineer	BEG/WJB	Date Started	7/20/94
Drill Agency	Stearns	Date Completed	7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
60	BENSEAL SLURRY				60.0'-62.0' Shelby Tube - 24" recovery [SOIL TEST: CL-SANDY LEAN CLAY]
		X	3 6 11 13		
65					
		X	5 9 14 28		68.0'-93.0' Gray, sandy CLAY, occasional coarse sand to fine gravel. Stiff.
70					
		X	5 7 13 14		
75					
		X	3 8 11 15		
80					

DELL ENGINEERING, INC.

Project LAIDLAW
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG/WJB
Drill Agency Stearns

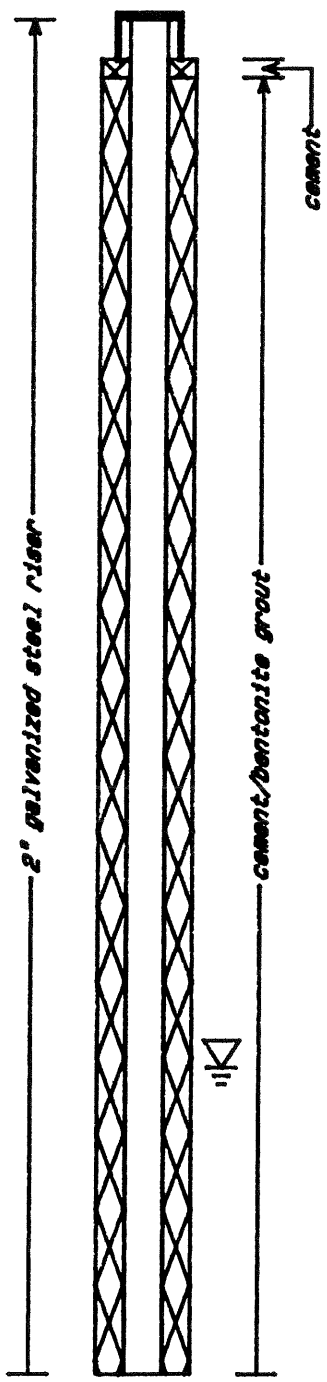
Hole/Well No. DB-13 (5 of 5)
Diameter of Drill Hole 9"
Total Depth of Hole 100 feet
Date Started 7/20/94
Date Completed 7/21/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
80					
			2 6 9 11		
85					
			3 7 12 12		
90	BENSEAL SLURRY				
			4 8 12 14		93.0'-95.0' Gray CLAY, occasional fine sand. Medium stiff.
95					
			4 8 12 12		
100					Ground Surface Elevation @ 654.35'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-14 (1 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	167 feet
Geologist/Engineer	BEG	Date Started	7/29/94
Drill Agency	Stearns	Date Completed	8/02/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4						
1						0.0'-140.0' See log of DB-1 for lithology from 0.0'-140.0'.
6						
11						
16						
21						
26						
31						
36						
41						
46						
51						
56						STATIC WATER LEVEL @ 53.75' Measured on 8/17/94
61						
66						



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-14 (2 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	167 feet
Geologist/Engineer	BEG	Date Started	7/29/94
Drill Agency	Stearns	Date Completed	8/02/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
70	2" galvanized steel riser	cement/bentonite grout				
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
130						

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

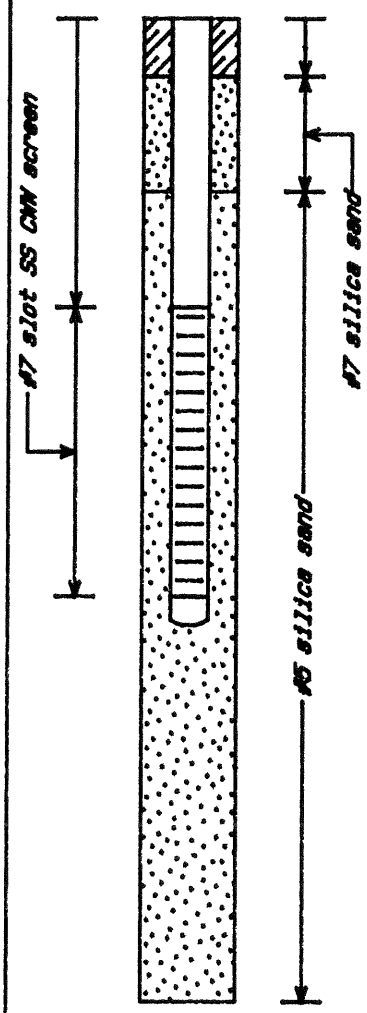
Hole/Well No. DB-14 (3 of 4)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 167 feet
Date Started 7/29/94
Date Completed 8/02/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
130					
135					
140	2" stainless steel riser; cement/bentonite grout; bentonite seal slurry grout		8 10 14 15		140.0'-142.0' Gray CLAY, occasional fine gravel. Very stiff.
			2 4 10 12		142.0'-143.0' Gray, silty, fine, sandy CLAY. Medium stiff. Moist.
					143.0'-145.5' Gray/brown, SILT and fine SAND. Medium dense. Moist to wet.
145			6 4 8 13		
			5 11 13 15		145.5'-151.2' Gray, sandy CLAY, trace silt, occasional coarse sand to fin gravel. Medium stiff.
			7 11 13 17		
150					

DELL ENGINEERING, INC.

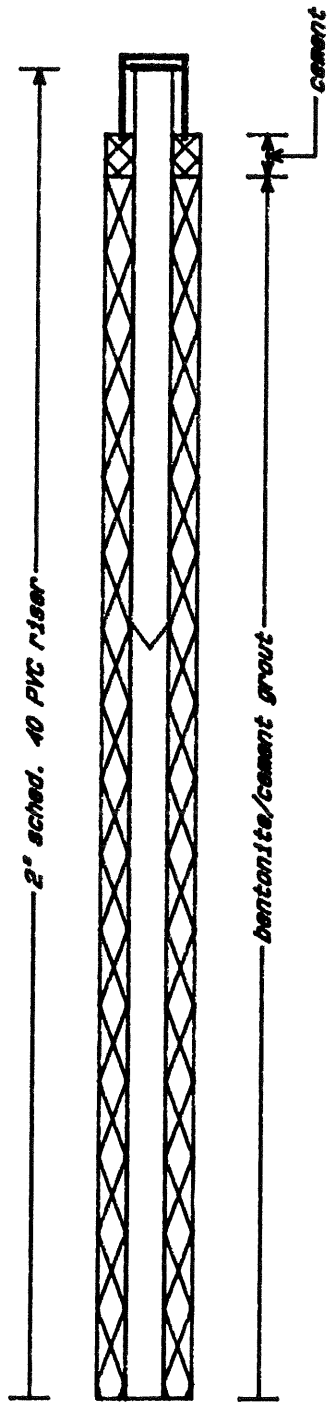
Project	Laidlaw	Hole/Well No.	DB-14 (4 of 4)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	167 feet
Geologist/Engineer	BEG	Date Started	7/29/94
Drill Agency	Stearns	Date Completed	8/02/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
150			8 22 41 35		151.2'-153.0' Clayey SAND and GRAVEL, fine to coarse sand, fine to coarse gravel, little silt. Very compact.
			12 23 33 54		153.0'-154.0' Fine to coarse SAND, occasional clay stringers <2" thick. Very dense. Wet.
155			114 63		154.0'-156.4' Silty, fine SAND, trace fine gravel. Very dense.
			57 100+		156.4'-156.6' SAND, SILT, and CLAY, some fine gravel. Very stiff.
					156.6'-156.9' Brown, fine SAND. Very dense. Wet.
			135+		156.9'-158.2' Brown/gray SILT, trace clay. Very dense. Moist.
160			36 104+		158.'-159.2' Brown, fine SAND. Very compact. Wet.
					159.2'-160.8' SILT, trace fine sand. Very compact. Moist to wet.
			35 100+		160.8'-163.6' Brown, fine to coarse SAND. Very compact. Wet.
			37 94		163.6'-165.0' Brown SILT and fine SAND. Moist to wet.
165			47 60 40+		165.0'-167.0' Silty, fine SAND, some coarse to fine gravel (till). Very compact.
					EOB @ 167.0'.
					TOC ELEVATION = 673.19'
					GROUND ELEVATION = 671.1'
170					



DELL ENGINEERING, INC.

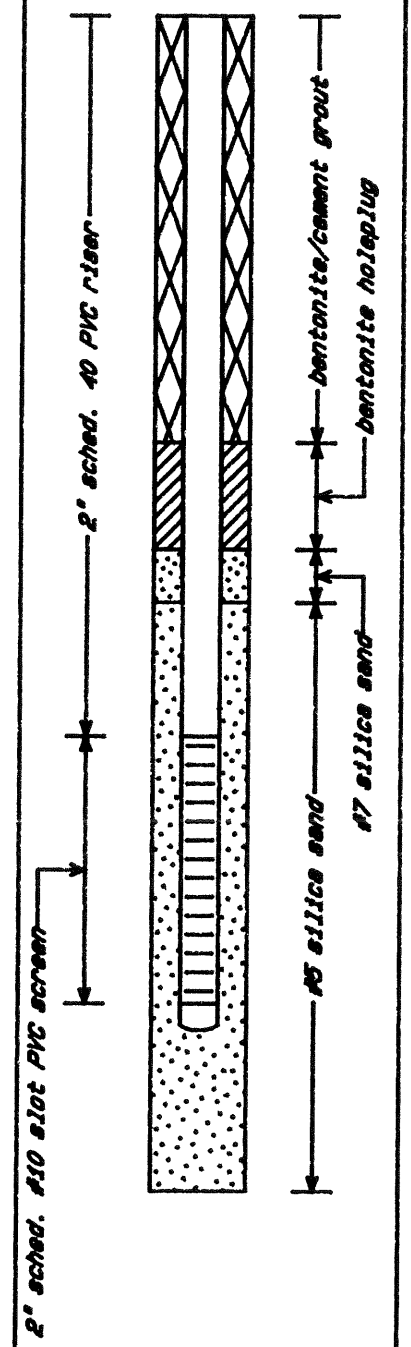
Project	Laidlaw	Hole/Well No.	DB-15 (1 of 2)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	52 feet
Geologist/Engineer	BEG	Date Started	8/02/94
Drill Agency	Stearns	Date Completed	8/03/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
3						
2						0.0'-38.0' See log of DB-1 for lithology from 0.0'-38.0'.
7						
12						STATIC WATER LEVEL @ 11.64' Measured on 8/17/94
17						
22						
27						

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-15 (2 of 2)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	52 feet
Geologist/Engineer	BEG	Date Started	8/02/94
Drill Agency	Stearns	Date Completed	8/03/94

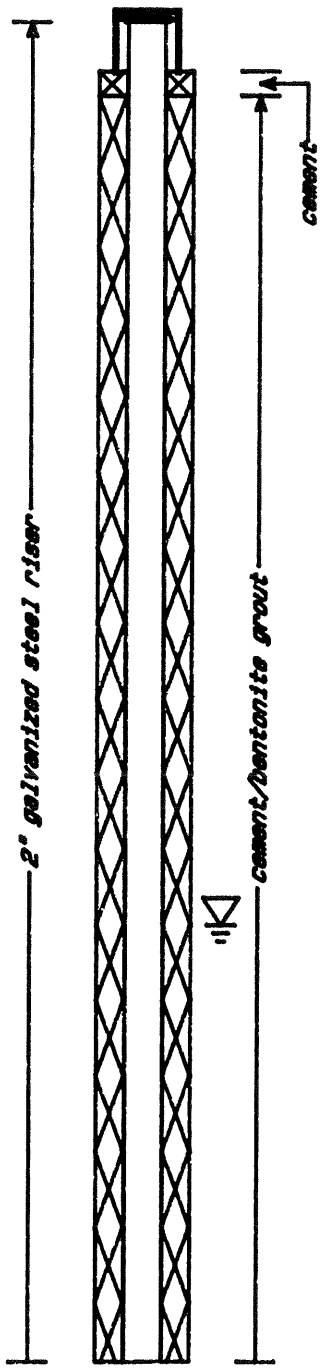
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
30					
35					
40			1 3 4 6		38.0'-41.2' Gray CLAY. Soft. 1" silt seam @ 39.5'.
			5 8 13 15		41.2'-41.7' Brown/gray, very fine, sandy SILT. Wet.
			2 4 8 11		41.7'-43.0' SILT, trace fine sand. Very moist.
					43.0'-44.5' Gray, silty CLAY. Medium stiff, 1" fine sand seam @ 43.6', wet.
45			5 3 17 22		44.5'-48.2' Brown, fine SAND. Dense. Wet.
			4 8 13 13		
			8 13 13 13		48.2'-49.0' Gray CLAY. Medium stiff.
					49.0'-50.0' Brown/gray, fine, sandy SILT. Wet.
50			8 9 9 9		50.0'-51.0' Gray CLAY. Medium stiff.
					51.0'-51.5' Brown/gray, fine sandy SILT.
					51.5'-52.0' Gray CLAY. Medium stiff.
					EOB @ 52.0'.
55					TOC ELEVATION = 673.37' GROUND ELEVATION = 671.8'



DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-16 (1 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	117 feet
Geologist/Engineer	BEG	Date Started	08/10/94
Drill Agency	Stearns	Date Completed	08/12/94

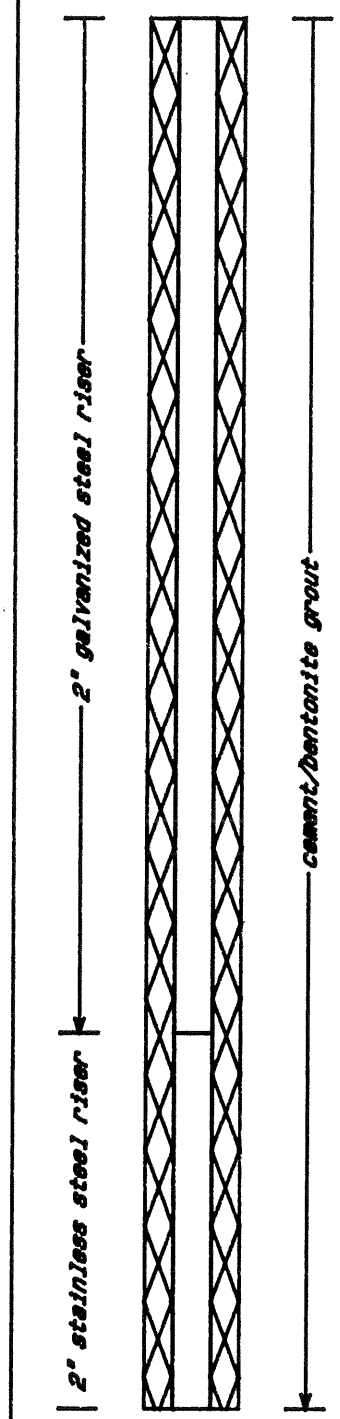
DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4						
1						0.0'-105.0' See Log of DB-3 for Lithology.
6						
11						
16						
21						
26						
31						
36						STATIC WATER LEVEL ELEVATION @ 624.52' Measured on 8/17/94
41						
46						
51						



DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-16 (2 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	117 feet
Geologist/Engineer	BEG	Date Started	08/10/94
Drill Agency	Stearns	Date Completed	08/12/94

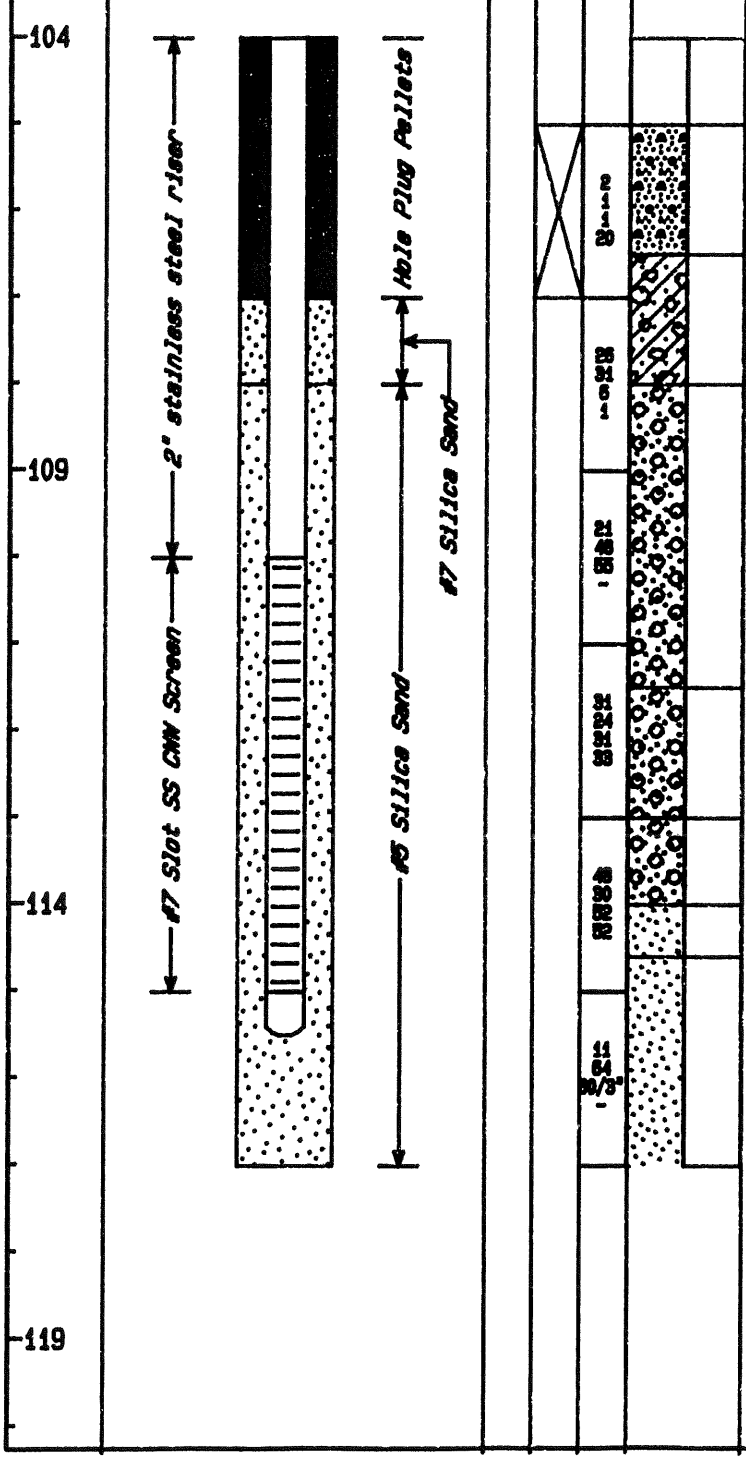
DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
52						
57						
62						
67						
72						
77						
82						
87						
92						
97						
102						



DELL ENGINEERING, INC.

Project	LAIDLAW	Hole/Well No.	DB-16 (3 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	117 feet
Geologist/Engineer	BEG	Date Started	08/10/94
Drill Agency	Stearns	Date Completed	08/12/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION



105.0'-106.5' Gray, loose, fine to coarse SAND and fine GRAVEL. Compact. Moist to wet.

106.5'-108.0' Silty SAND and GRAVEL. Compact. Moist to Wet.

108.0'-111.5' Fine to coarse SAND and GRAVEL, occasional stringers of silt and sand, some gravel. Very Compact. Moist. (< 2" thick).

111.5'-113.0' Medium to coarse SAND and fine to coarse GRAVEL, trace fine sand and silt. Wet.

113.0'-114.0' Fine to coarse SAND and GRAVEL, trace silt. Wet.

114.0'-114.6' Brown, fine SAND, little medium sand and silt. Wet.

114.6'-117.0' Fine to coarse SAND and GRAVEL, little silt. Wet.

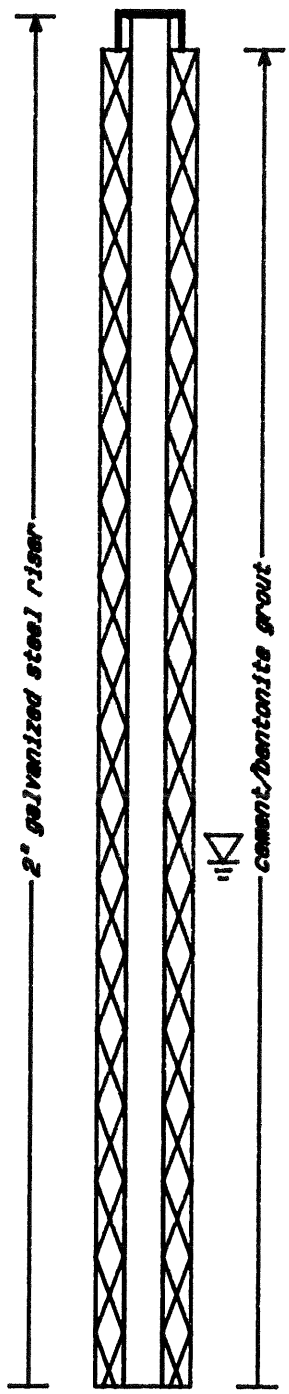
EOB @ 117.0'

Ground Surface Elevation @ 660.96'
Top of Casing Elevation @ 658.99'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-17 (1 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	203.5 feet
Geologist/Engineer	BEG	Date Started	7/25/94
Drill Agency	Stearns	Date Completed	7/28/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
4						
1						0.0'-100.0' See log of DB-7 for lithology from 0.0'-100.0'.
6						
11						
16						
21						
26						
31						
36						
41						
46						
51						
56						
61						STATIC WATER LEVEL @ 60.88' Measured on 8/17/94
66						
71						
76						
81						
86						
91						
96						



DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-17 (2 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	4.25" ID HSA
Job No.	940387	Total Depth of Hole	203.5 feet
Geologist/Engineer	BEG	Date Started	7/25/94
Drill Agency	Stearns	Date Completed	7/28/94

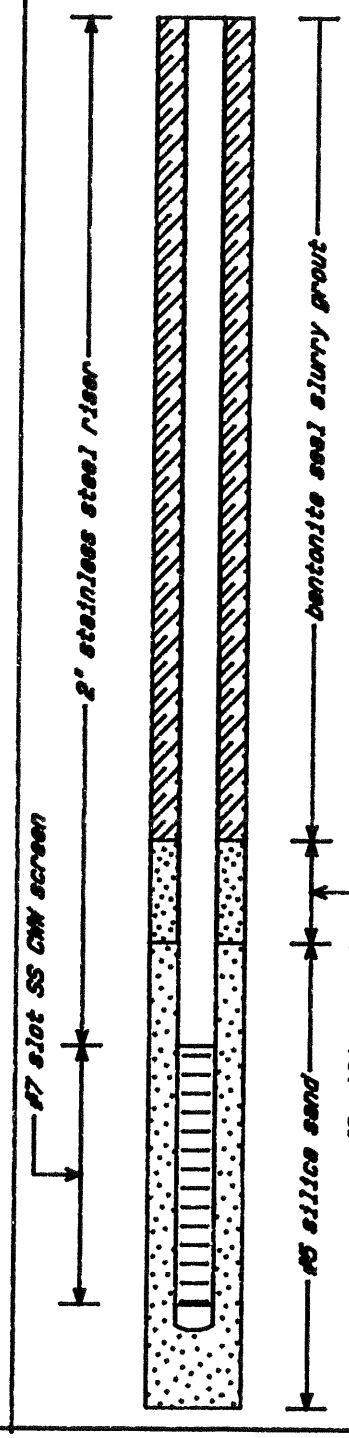
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
100					
105		X	4 7 10 13		104.0'-109.0' Gray, silty CLAY, occasional coarse sand to fine gravel. Stiff.
110	2" galvanized steel riser; cement/bentonite grout	X	6 9 13 21		109.0'-124.0' Gray, silty CLAY, trace fine sand, occasional medium to coarse sand. Very stiff.
115		X	6 10 16 24		
120		X	5 9 13 16		
125		X	7 13 17 23		124.0'-134.0' Gray CLAY, little silt, occasional fine to medium sand. Very stiff.

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-17 (3 of 5)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 203.5 feet
Date Started 7/25/94
Date Completed 7/28/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
127					
132					134.0'-149.0' Gray CLAY, occasional fine to coarse sand. Stiff.
137					
142					
147					149.0'-153.0' Fine to coarse SAND, some fine gravel, occasional stringers of clayey sand and gravel (<2" thick). Wet.
152					[SOIL TEST: SP-POORLY GRADED SAND]



DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-17 (4 of 5)
Diameter of Drill Hole 4.25" ID HSA
Total Depth of Hole 203.5 feet
Date Started 7/25/94
Date Completed 7/28/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
154	cement/bentonite grout		17 100+		153.0'-159.0' Gray, fine, sandy CLAY, some silt (till). Very dense. 2" fine sand seam @ 155.5'.
159			21 50 50+		159.0'-179.0' Gray, fine, sandy CLAY, some silt, occasional coarse sand to fine gravel (till). Very dense. Dry.
164			46 57		
169			35 50		[SOIL TEST: SC-CLAYEY SAND]
174			15 17 30		[SOIL TEST: SC CLAYEY SAND]
179			10 11 15 20		179.0'-184.0' CLAY and fine to medium SAND, trace coarse sand, some silt. Stiff. Moist. [SOIL TEST: SC-CLAYEY SAND]
184					

DELL ENGINEERING, INC.

Project: Laidlaw
Location: Ottawa County Farms Landfill
Job No.: 940387
Geologist/Engineer: BEG
Drill Agency: Stearns

Hole/Well No.: DB-17 (5 of 5)
Diameter of Drill Hole: 4.25" ID HSA
Total Depth of Hole: 203.5 feet
Date Started: 7/25/94
Date Completed: 7/28/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	SAMPLE	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
184	cement/bentonite grout		8 10 13 17		184.0'-189.0' Clayey, fine to medium SAND, trace coarse sand, some silt. Dense. Moist.
189			5 8 10 15		189.0'-196.5' Silty, fine to medium SAND, trace clay. Dense. Moist.
194			8 15 15 20		
					196.5'-200.0' Gray silty, CLAY, and fine GRAVEL, some coarse sand. Very dense.
199			18 21 22 100+		200.0'-200.3' Medium to coarse sand, some fine gravel.
					200.3'-201.5' Fine to medium sand, trace coarse sand, trace silt. Moist.
					201.5'-202.5' Fractured bedrock - SANDSTONE.
204					202.5'-203.5' Bedrock - Green SANDSTONE.
					EOB @ 203.5'.

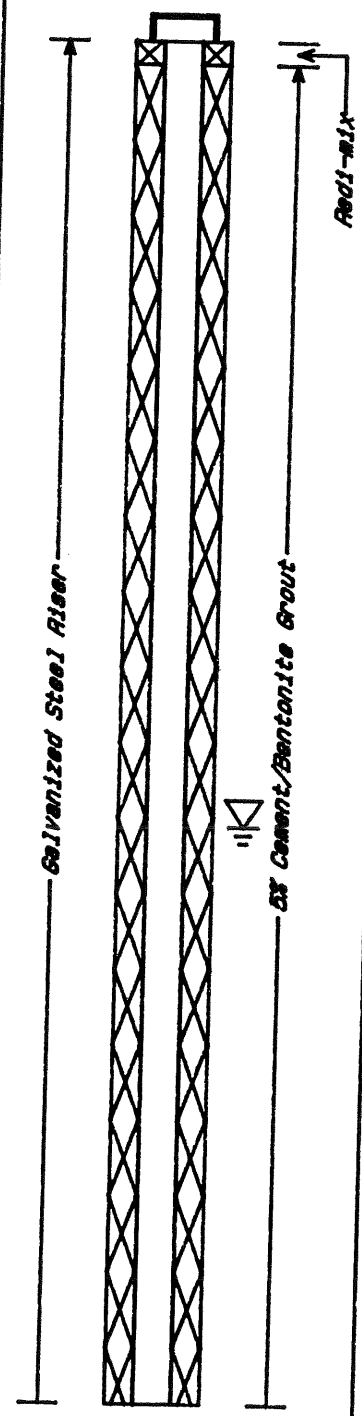
TOC ELEVATION = 679.65'
GROUND ELEVATION = 677.2'

DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-18 (1 of 5)
Diameter of Drill Hole 9"
Total Depth of Hole 176 feet
Date Started 9/21/94
Date Completed 9/26/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
2						
3						0.0'-100.0' No samples collected.
8						
13						
18						
23						
28						
33						
38						
43						
48						
53						
58						STATIC WATER LEVEL @ 57.73' Measured on 10/06/94
63						
68						
73						
78						
83						
88						
93						
98						



DELL ENGINEERING, INC.

Project: Laidlaw
Location: Ottawa County Farms Landfill
Job No.: 940387
Geologist/Engineer: BEG
Drill Agency: Stearns

Hole/Well No.: DB-18 (2 of 5)
Diameter of Drill Hole: 9"
Total Depth of Hole: 176 feet
Date Started: 9/21/94
Date Completed: 9/26/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
100	Galvanized Steel Riser; 5X Cement/Bentonite Grout	X	2 2 3 3		100.0'-105.0' Gray CLAY, little fine sand, occasional fine gravel. Medium stiff. Moist.
105		X	3 4 7 16		105.0'-115.0' Gray CLAY, little fine sand, occasional coarse sand to fine gravel. Medium stiff.
110		X	2 3 15 12		
115		X	4 5 12 21		115.0'-125.0' Gray CLAY, trace fine sand, occasional coarse sand to fine gravel. Stiff.
120		X	3 7 15 21		
125		X	3 3 8 15		125.0'-134.0' Gray CLAY, occasional fine sand. Medium stiff.
130					

DELL ENGINEERING, INC.

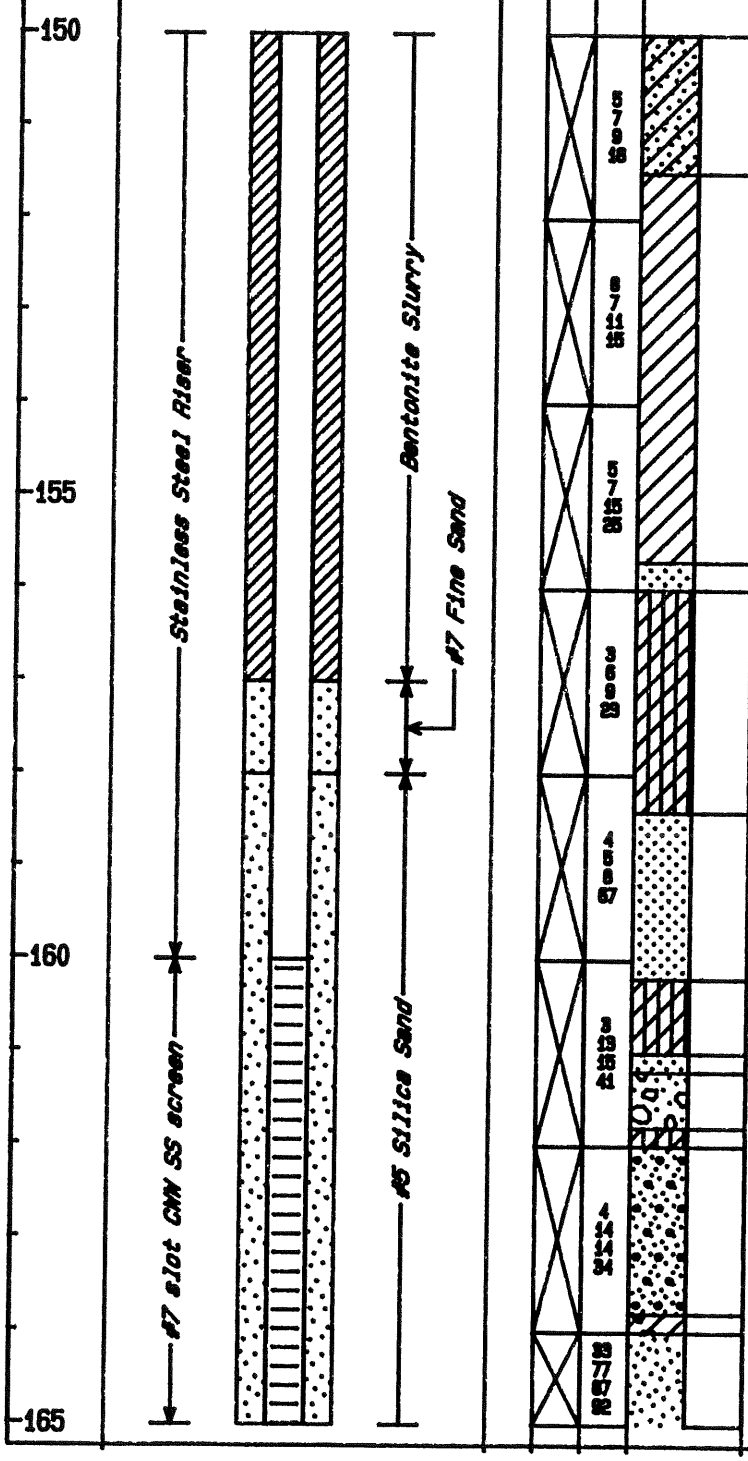
Project	Laidlaw	Hole/Well No.	DB-18 (3 of 5)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	176 feet
Geologist/Engineer	BEG	Date Started	9/21/94
Drill Agency	Stearns	Date Completed	9/26/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
130	Galvanized Steel Riser; 5% Cement/Bentonite Grout		4 14 21 34		
					134.0'-140.0' Brown, gray CLAY. Meduim stiff.
135			4 5 9 16		
140	Stainless Steel Riser		3 5 10 19		140.0'-144.0' Gray CLAY, occasional fine gravel. Medium stiff.
			4 5 15 27		
			5 6 10 19		144.0'-146.5' Gray CLAY, trace fine sand, occasional fine gravel. Medium stiff.
145			3 4 11 31		146.5'-151.5' Brown, fine, sandy CLAY. Medium stiff. Moist.
			4 4 9 13		
150					

DELL ENGINEERING, INC.

Project: Laidlaw	Hole/Well No.: DB-18 (4 of 5)
Location: Ottawa County Farms Landfill	Diameter of Drill Hole: 9"
Job No.: 940387	Total Depth of Hole: 176 feet
Geologist/Engineer: BEG	Date Started: 9/21/94
Drill Agency: Stearns	Date Completed: 9/26/94

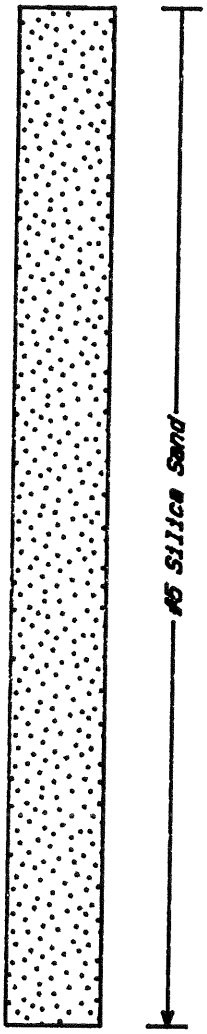
DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
150			5 7 9 18		
					151.5'-155.7' Brown CLAY, little fine sand, occasional coarse sand to fine gravel.
			8 7 11 15		
155			5 7 15 25		
					155.7'-156.0' Brown, fine SAND, little silt. Wet.
			3 6 9 23		156.0'-158.4' Gray, silty CLAY, trace fine sand. Medium stiff. Moist.
			4 5 8 67		158.4'-160.2' Brown, fine SAND, some silt. Moist to very moist.
160			3 13 15 41		160.2'-161.0' Gray, silty CLAY, little fine sand.
					161.0'-161.2' Brown, loose, fine SAND. Wet.
					161.2'-161.8' Fine to coarse SAND and GRAVEL. Wet.
			4 14 14 34		161.8'-162.0' Gray, clayey SILT. Moist.
					162.0'-163.8' Fine to coarse SAND, some fine gravel. Wet. (Water level @ 35.3')
					163.8'-164.0' CLAY and GRAVEL.
165			33 77 87 92		164.0'-165.0' Brown/gray, fine to medium SAND, trace coarse sand. Wet.



DELL ENGINEERING, INC.

Project Laidlaw
Location Ottawa County Farms Landfill
Job No. 940387
Geologist/Engineer BEG
Drill Agency Stearns

Hole/Well No. DB-18 (5 of 5)
Diameter of Drill Hole 9"
Total Depth of Hole 176 feet
Date Started 9/21/94
Date Completed 9/26/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
165			35 77 87 92		165.0'-167.0' Gray, clayey SAND and GRAVEL, some silt. Very compact. Moist.
			5 18 32 120		167.0'-167.5' Gray SILT, trace fine sand. Moist.
					167.5'-167.7' Fine SAND. Wet.
			120/5"		167.7'-170.0' Fine to coarse, clayey SAND and GRAVEL. Moist to wet.
170			43 91 100/4"		170.0'-173.0' Gray/brown, fine to medium, silty SAND, trace clay and fine gravel. Wet.
					173.0'-176.0' Clayey, fine SAND, occasional coarse sand to fine gravel. Very dense. Moist. (Till)
175			15 63 77 100/3"		
					EOB @ 176'
					GROUND ELEVATION @ 673.42'
					TOP OF CASING ELEVATION @ 675.87'
					STATIC WATER LEVEL ELEVATION @ 518.14'
180					

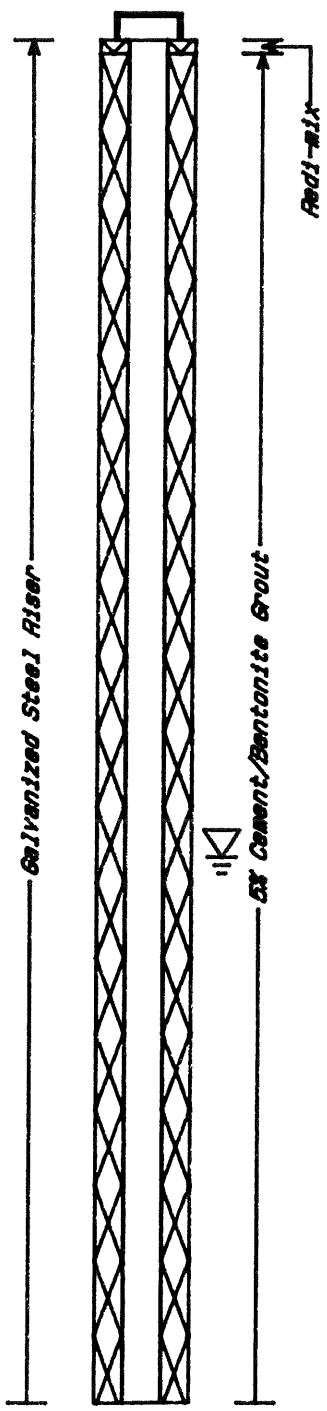
#5 Silica Sand

PROJECT: LAIDLAW - COOPERSVILLE	
PROJ. #: 940387.0004	DATE: 8-26-94
TYPE: Q SA A SPECIAL	SAMPLERS: TPS/DCC
PARAMETERS: VOA, GEN., TOC, F.E. METALS, PHENOLS, NUT.	
SAMPLE ORDER: PUMP BLANK, DB-1, 14, 15, 3, 16, 2, 17, 5, ATMOSPHERE BLANK,	
NOT SAMPLED (explain in Field Report):	

WELL #: DB-1	TIME: 1030	WELL #: DB-14	TIME: 1055
WD: 215.50	pH: 6.09 Temp: 13.2°C	WD: 162.10	pH: 6.44 Temp: 17.2°C
WL: 60.86	S.C.: 1832 Temp: 14.4°C	WL: 55.69	S.C.: 1072 Temp: 17.0°C
SW: 154.64	Notes: GRUNDFOS	SW: 106.41	Notes: GRUNDFOS
PURGE (gal): 77.50		PURGE (gal): 53.25	2 PRE-FILTERS
WELL #: DB-2	TIME: 1420	WELL #: DB-15	TIME: 1150
WD: 204.80	pH: 7.38 Temp: 18.4°C	WD: 50.00	pH: 8.29 Temp: 14.4°C
WL: 50.27	S.C.: 1113 Temp: 18.7°C	WL: 12.67	S.C.: 1082 Temp: 17.1°C
SW: 154.53	Notes: GRUNDFOS	SW: 37.33	Notes: GRUNDFOS
PURGE (gal): 77.50		PURGE (gal): 18.75	8 PRE-FILTERS
WELL #: DB-3	TIME: 12:50	WELL #: DB-16	TIME: 1330
WD: 209.40	pH: 7.54 Temp: 19.3°C	WD: 117.00	pH: 7.41 Temp: 18.0°C
WL: 41.64	S.C.: 1810 Temp: 17.9°C	WL: 36.24	S.C.: 947 Temp: 17.9°C
SW: 167.76	Notes: GRUNDFOS	SW: 80.76	Notes: GRUNDFOS
PURGE (gal): 84.00		PURGE (gal): 40.50	4 PRE-FILTERS
WELL #: DB-5	TIME: 1605	WELL #: DB-17	TIME: 1455
WD: 45.40	pH: 12.69 Temp: 16.9°C	WD: 154.50	pH: 8.87 Temp: 19.0°C
WL: 8.44	S.C.: 1821 Temp: 17.0°C	WL: 63.03	S.C.: 15120 Temp: 19.1°C
SW: 36.96	Notes: GRUNDFOS	SW: 91.47	Notes: GRUNDFOS
PURGE (gal): 18.50		PURGE (gal): 46.00	
WELL #: DB-11	TIME: 1645	WELL #:	TIME: 1700
WD: 109.60	pH: 10.96 Temp: 17.2°C	WD: ATMOSPHERE BLANK	pH: Temp:
WL: 28.19	S.C.: 1392 Temp: 17.0°C	WL:	S.C.: Temp:
SW: 81.41	Notes: GRUNDFOS	SW:	Notes: FROM WW
PURGE (gal): 41.00		PURGE (gal):	WATER IN COOLERS.

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-19 (1 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	152 feet
Geologist/Engineer	BEG	Date Started	9/27/94
Drill Agency	Stearns	Date Completed	9/29/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
2						0.0'-100.0' No samples collected.
3						
8						
13						
18						
23						
28						
33						
38						
43						
48						
53						
58						STATIC WATER LEVEL @ 60.06' Measured on 10/06/94
63						
68						
73						
78						
83						
88						
93						
98						

DELL ENGINEERING, INC.

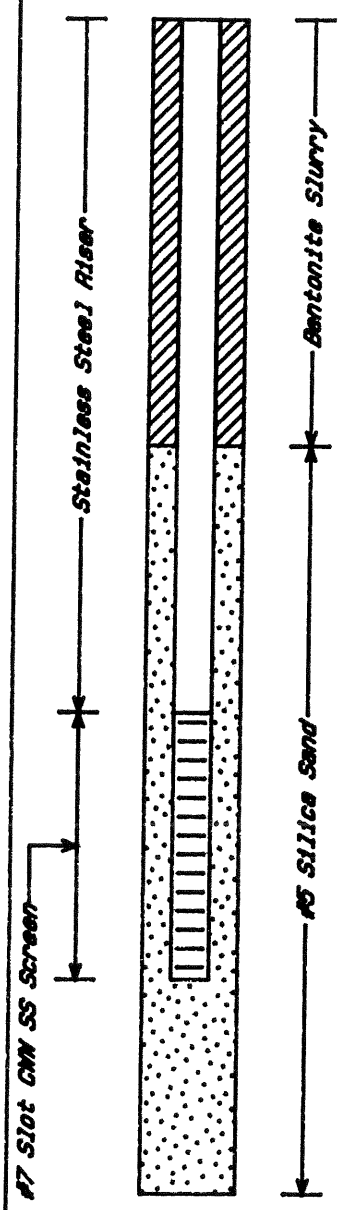
Project	Laidlaw	Hole/Well No.	DB-19 (2 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	152 feet
Geologist/Engineer	BEG	Date Started	9/27/94
Drill Agency	Stearns	Date Completed	9/29/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
100	Galvanized Steel Riser; 5% Cement/Bentonite Grout	X	5 10 10 16		100.0'-105.0' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff. Moist.
105		X	3 3 5 8		105.0'-110.0' Gray CLAY, occasional coarse sand to fine gravel. Medium stiff. Moist.
110		X	2 4 8 12		110.0'-115.0' Gray CLAY, little fine sand, trace silt, occasional pebble Medium stiff.
115		X	3 5 10 17		115.0'-135.0' Gray CLAY, trace fine sand, occasional pebbles. Medium stiff.
120		X	4 14 18 24		
125	Stainless Steel Riser	X	3 5 8 13		
130					

DELL ENGINEERING, INC.

Project Laidlaw	Hole/Well No. DB-19 (3 of 3)
Location Ottawa County Farms Landfill	Diameter of Drill Hole 9"
Job No. 940387	Total Depth of Hole 152 feet
Geologist/Engineer BEG	Date Started 9/27/94
Drill Agency Stearns	Date Completed 9/29/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
130		X	4 13 12 20		
135		X	4 6 16 35		135.0'-140.0' Gray CLAY, trace fine sand, occasional pebbles. Medium stiff. 2" Fine SAND and CLAY seam @ 136.0 feet.
140		X	3 5 16 43		140.0'-141.0' Gray CLAY, trace fine sand, occasional pebbles. Medium stiff. 141.0'-142.0' Gray, sandy CLAY, some silt. Moist.
		X	1 1 2 3		142.0'-149.3' Brown, loose, fine SAND, trace silt. Wet. (Water level @ 64.0')
145		X	3 5 28 25		
		X	13 18 50 56		
		X	10 24 25 30		149.3'-152.0' Gray, fine, sandy CLAY. Very stiff. Moist to dry.
150		X	6 20 75		EOB @ 152.0'
155					

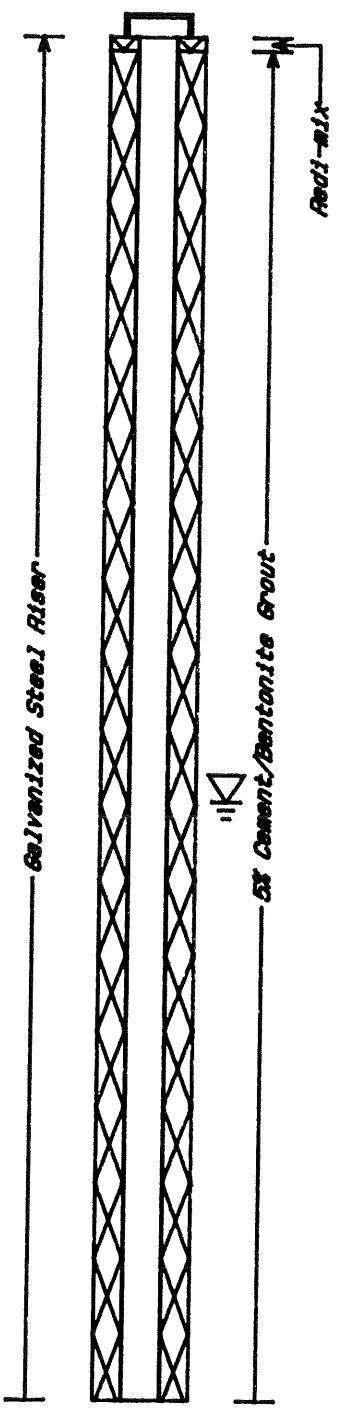


GROUND ELEVATION @ 676.48'
TOP OF CASING ELEVATION @ 678.57'
STATIC WATER LEVEL ELEVATION @ 518.51'

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-20 (1 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	149.3 feet
Geologist/Engineer	BEG	Date Started	9/29/94
Drill Agency	Stearns	Date Completed	10/04/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL		Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
2						0.0'-100.0' See DB-10 for lithology.
3						
8						
13						
18						
23						
28						
33						
38						
43						
48						
53						
58						STATIC WATER LEVEL @ 56.18' Measured on 10/06/94
63						
68						
73						
78						
83						
88						
93						
98						



DELL ENGINEERING, INC.

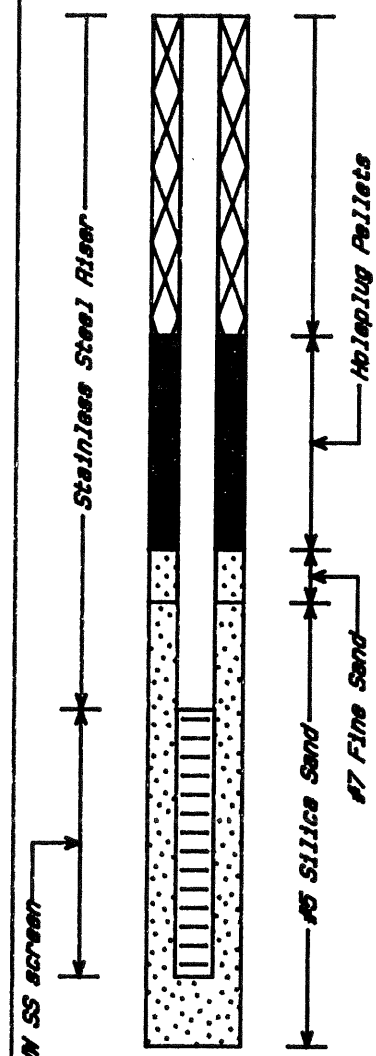
Project	Laidlaw	Hole/Well No.	DB-20 (2 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	149.3 feet
Geologist/Engineer	BEG	Date Started	9/29/94
Drill Agency	Stearns	Date Completed	10/04/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
100	Galvanized Steel Riser; 5% Cement/Bentonite Grout	X	3 10 17 24		100.0'-105.0' Gray CLAY. Medium stiff. Moist.
105		X	4 12 20 26		105.0'-110.0' Gray, fine, sandy CLAY, occasional pebbles. Stiff. Moist.
110		X	7 10 22 30		110.0'-125.0' Gray CLAY, little fine sand, occasional pebbles. Stiff.
115		X	5 10 18 29		
120		X	4 9 9 22		
125	Stainless Steel Riser	X	2 4 6 13		125.0'-135.0' Gray CLAY, trace fine sand, occasional pebbles. Stiff.
130					

DELL ENGINEERING, INC.

Project	Laidlaw	Hole/Well No.	DB-20 (3 of 3)
Location	Ottawa County Farms Landfill	Diameter of Drill Hole	9"
Job No.	940387	Total Depth of Hole	149.3 feet
Geologist/Engineer	BEG	Date Started	9/29/94
Drill Agency	Stearns	Date Completed	10/04/94

DEPTH IN FEET	WELL CONSTRUCTION DETAIL	Sample	BLOWS/6	GRAPHIC SYMBOL	DESCRIPTION
130			4 4 15 23		
135			4 10 11 12		135.0'-140.0' Gray CLAY, trace fine sand, occasional pebbles. Stiff. (some silt seams < 2" thick)
140			4 5 9 20		140.0'-142.0' Gray CLAY, trace fine sand, occasional pebbles. Stiff.
			1 2 13 17		142.0'-145.5' Gray, fine, sandy CLAY, occasional pebbles. Stiff.
145			4 11 20 22		145.5'-147.5' Brown, fine SAND, trace silt. Dense. Wet. (Water level @ 90')
			50 50/3"		147.5'-147.8' Sandy CLAY, some silt, occasional pebbles. Very stiff. Moist to dry. (Till)
150					147.8'-148.0' Brown, fine SAND, trace silt. Dense. Moist.
					148.0'-149.3' Gray, sandy CLAY, some silt, occasional pebbles. Very stiff. Dry. (Till)
					EOB @ 149.3'
155					GROUND ELEVATION @ 672.06' TOP OF CASING ELEVATION @ 673.75' STATIC WATER LEVEL ELEVATION @ 517.57'



PIEZOMETERS DB-1, DB-2, DB-3, DB-5
DB-11, DB,14, DB-15, DB-16, DB-17

Field Report

Dell Engineering, Inc., Holland, Michigan (FIELD SERVICES GROUP)

PROJECT	DATE
LAIDLAW - COOPERSVILLE 940387.0004	8-26-94

REMEDIATION

Flowmeter:		Flowrate (GPM):	
Maintenance / Visual Inspection		System Operable (Y/N)	
Dissolved O_2 measurement:		pH measurement:	
Sampled System		Sampled Wells	
Parameters:		Lab:	

SAMPLE ORDER:

NOT SAMPLED (see Notes):

GROUNDWATER

Samplers: TPS/DCL | Lab: WW (EARTH TECH.)

PARAMETERS: VOA, GEN, TOC, FF-METALS, PHENOLS, NUT

SAMPLE ORDER: DB-1, PUMP BLANK#1, DB-14, DB-15, DB-3, DB-16, DB-2, DB-17, DB-5, DB-11, → ATMOSPHERE BLANK.

NOT SAMPLED (see Notes):

NOTES

SPECIAL WS FOR BEG, USING WW (EARTH TECH.) BOTTLES. AFTER SAMPLING WENT TO WW TO DROP OFF SAMPLES.

Arrival Time: 0905	Departure Time: 1725
Vehicle #: 8	Sign: [illegible]

Field Instrument Calibration Record

SITE: LAIDLAW - COOPERSVILLE LOCATION: COOPERSVILLE, MI

PROJECT # 940387 TASK #: 0004

EVENT TYPE: WS DATE: 8-26-94

pH METER CALIBRATION

TIME (pre-event): 900 INITIALS: TPS		METER READING	TEMP.
BUFFER (use 7.0 and one other)	4.0	4.00	23.9°c
	7.0	7.00	24.4°c
	10.0		

TIME (post-event): 17:27 INITIALS: DCL		METER READING	TEMP.
BUFFER (use same 2 as above)	4.0	3.92	29.1°c
	7.0	7.16	28.4°c
	10.0		

NOTES / COMMENTS :

INSTRUMENT (make & model #): CORNING M90

SPECIFIC CONDUCTANCE METER CALIBRATION

TIME (pre-event): 0846	BY: TPS
STANDARD USED (m-mhos/cm): 1413	TEMPERATURE: 23.7°c
INSTRUMENT READING (m-mhos/cm): 1413	
TIME (post-event): 17:31	BY: DCL
STANDARD USED (m-mhos/cm): 1413	TEMPERATURE: 28.6°c
INSTRUMENT READING (m-mhos/cm): 1402	

NOTES / COMMENTS:

INSTRUMENT (make & model #): CORNING M90

BORING/WELL LOG DATA

SUPERIOR ENVIRONMENTAL CORP.

MW-1R

PROJECT NO.:	109209-S	WELL/BORING NO.:	MW-1 (1)
PROJECT:	Laidlaw Landfill	DATE DRILLED:	8-24-93
LOCATION:	Coopersville, MI	CASING TYPE/DIA.:	Sch. 40 PVC 2"
DRILLING METHOD:	Hollow Stem Auger	TOTAL CASING:	73'
TOTAL DEPTH DRILLED:	79'	T.O.C. ELEVATION:	N/A
GROUND ELEVATION:	N/A	SCREEN TYPE/LENGTH:	Sch 40 PVC 0.010 slot/5'
GROUT TYPE/QUANTITY:	Portland Cement - 8 bags	SCREENED INTERVAL:	73-78'
GROUT INTERVAL(S):	0-68'	GRAVEL PACK TYPE:	10/20 Sand and Natural
DEPTH TO WATER:	N/A	GRAVEL PACK INTERVAL:	68-79'
WATER LEVEL ELEVATION:	N/A		
REMARKS:	1) Well located at extreme eastern edge of berm. Well location bisects Cell A. 2) Well equipped with 1' long silt trap below bottom of screen. 3) All depths listed are from grade level.		
LOGGED BY:	Gordon Hill/Travis Boylan		

PHYSICAL DESCRIPTION

DEPTH	FORMATION DESCRIPTION
0-6'	CLAY, soft, brown and gray intermixed
6-21'	CLAY, gray, mottled, dry, firm
21-41'	CLAY, gray, moist, soft
41-56'	CLAY, gray, interbedded gravel, moist, soft
56-69.5'	CLAY, gray, dry, firm, interbedded gravel
69.5-80'	SAND/GRAVEL, coarse, gray, saturated

ANALYTICAL INFORMATION

DELL ENGINEERING, INC.

FIELD REPORT

PAGE 1 OF 1

PROJECT: Laidlaw - OCFL
LOCATION: Coopersville

PROJECT #: 940387-02
CONTACT:

DATE: 10/5/94
WEATHER: ptly cloudy
TEMPERATURE: 55 -
WIND: none
HUMIDITY: low

PURPOSE: Site Evaluation __; Soil Boring/Well Installation X;
Sampling: Groundwater __ Soil __; Survey __; Meeting __;
Other

PERSONNEL: BEG
ARRIVAL TIME: 9:00

VEHICLE: #3 GMC 4x4
DEPARTURE TIME: 12:45

NOTES:

Arrived on site. Drillers getting ready to jet DB-17. We've been having trouble getting water out of this well — plus high conductivity.

*Note: pH meter would not calibrate

Cond.	TDS	temp	pH*	temp
1040	520	9.7		
1111	557	11.5		
1114	554	12.0	7.76	11.6
1070	533	12.0	8.01	12.4
1050	521	11.8		
1035	517	12.6		
1036	519	12.6	8.34	12.8
1037	518	12.7	8.76	12.8
1035	518	13.1		

Put down ~20 gallons of water and then ran the air compressor/jet tool for ~1½ hrs. Still not making water very fast — maybe ½ gpm.

10:30 Stopped developing: 10:45 Called BAL to see if anything else. No. Do need measurements on MW-1R and MW2R. Took measurements & replaced locks on same. 12:45 off site.

ACTION ITEMS:
locks, MW-1R/2R?

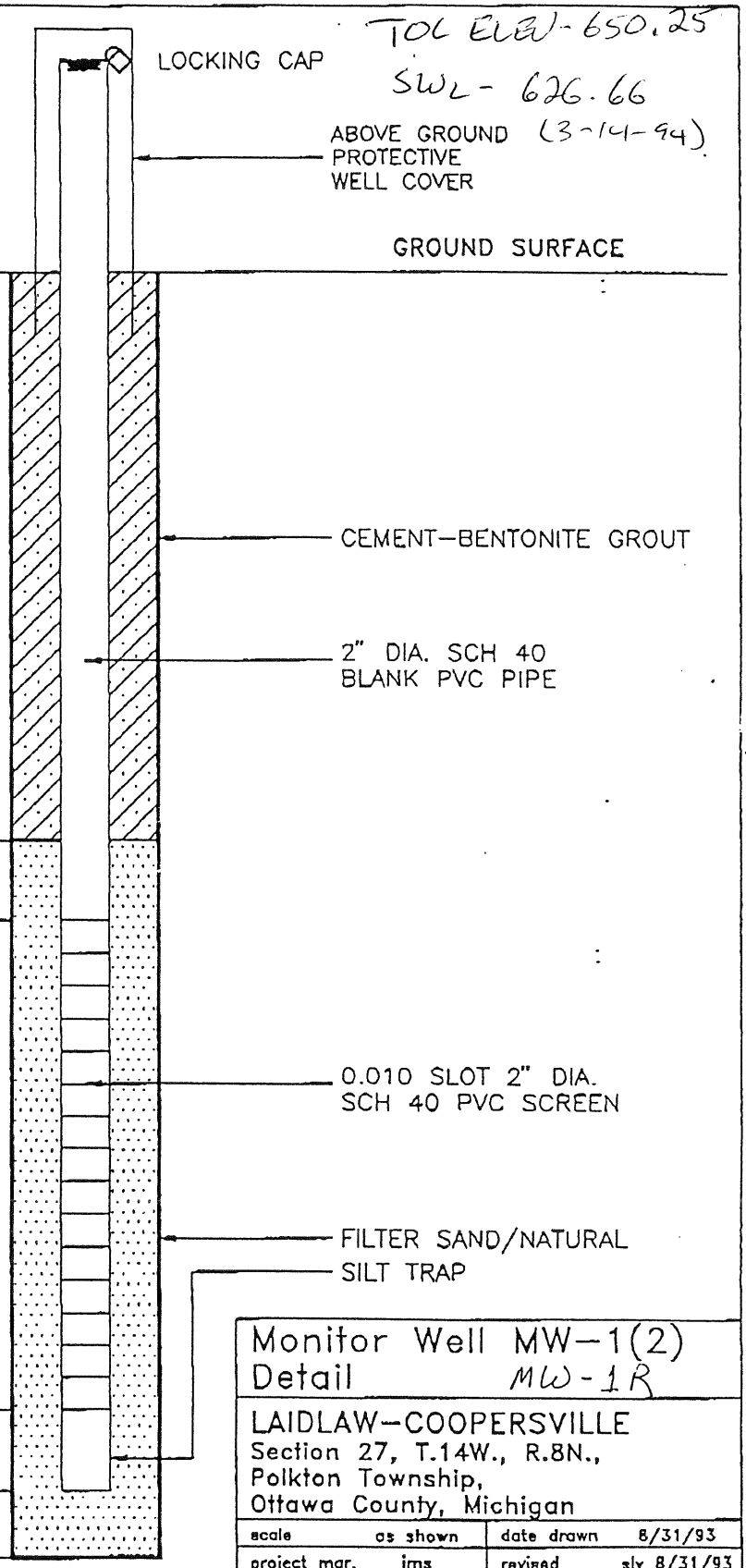
SIGNATURE: Bruce Gillett

TITLE: Hydrogeologist

04/92 FIELD.RPT

NOTES:
Not drawn to scale.
See Boring Log for detailed description.

TOC ELEV - 650.25
SWL - 626.66
(3-14-94)



Monitor Well MW–1(2)
Detail MW-1R

LAIDLAW–COOPERSVILLE
Section 27, T.14W., R.8N.,
Polkton Township,
Ottawa County, Michigan

scale	as shown	date drawn	8/31/93
project mgr.	jms	revised	slv 8/31/93
Superior ENVIRONMENTAL CORP		drawn by	slv
		109209–02	

BORING/WELL LOG DATA

MW-2R

SUPERIOR ENVIRONMENTAL CORP.

PROJECT NO.:	109209-S	WELL/BORING NO.:	MW-2 (2)
PROJECT:	Laidlaw Landfill	DATE DRILLED:	8-23-93
LOCATION:	Coopersville, MI	CASING TYPE/DIA.:	Sch. 40 PVC 2"
DRILLING METHOD:	Hollow Stem Auger	TOTAL CASING:	73'
TOTAL DEPTH DRILLED:	80'	T.O.C. ELEVATION:	N/A
GROUND ELEVATION:	N/A	SCREEN TYPE/LENGTH:	Sch 40 PVC .010 slot/5'
GROUT TYPE/QUANTITY:	Portland Cement - 8 bags	SCREENED INTERVAL:	73-78'
GROUT INTERVAL(S):	0-68'	GRAVEL PACK TYPE:	Filter Sand and Natural
DEPTH TO WATER:	N/A	GRAVEL PACK INTERVAL:	68-80'
WATER LEVEL ELEVATION:	N/A		
REMARKS:	1) Well located at extreme eastern edge of berm. Well location bisects Cell B. 2) Well equipped with 1' long silt trap below bottom of screen. 3) All depths listed are from grade level.		
LOGGED BY:	Gordon Hill/Travis Boylan		

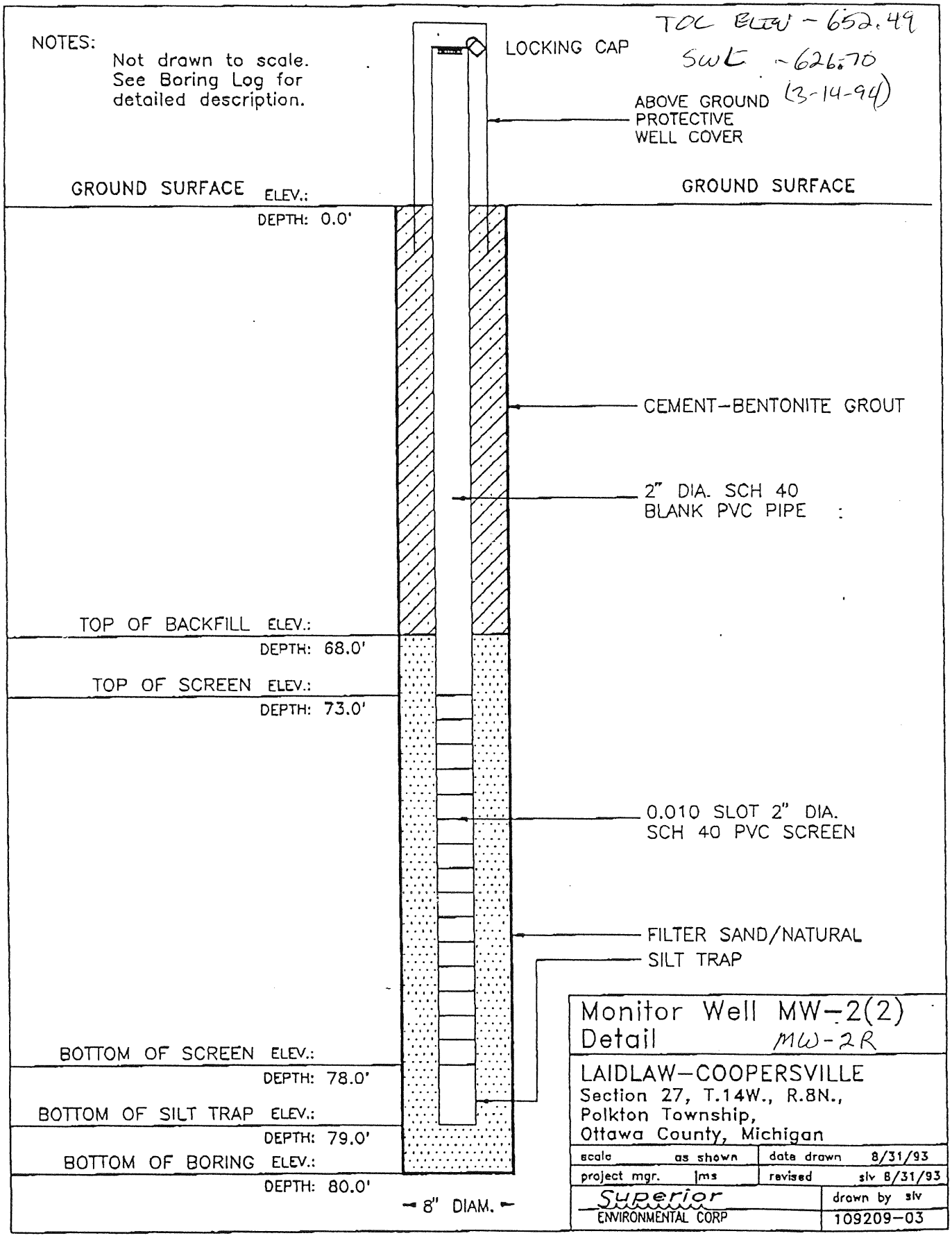
PHYSICAL DESCRIPTION

DEPTH	FORMATION DESCRIPTION
0-19'	CLAY, brown, mottled, dry
19-29'	CLAY, gray, mottled, intermixed gravel, moist
29-46'	CLAY, gray, semi-moist
46-69.5'	CLAY, gray, dry, firm, intermixed gravel
69.5-80'	SAND/GRAVEL, gray, coarse, saturated

ANALYTICAL INFORMATION

NOTES:
Not drawn to scale.
See Boring Log for detailed description.

TOC ELEV - 652.49
SWL - 626.70
(3-14-94)



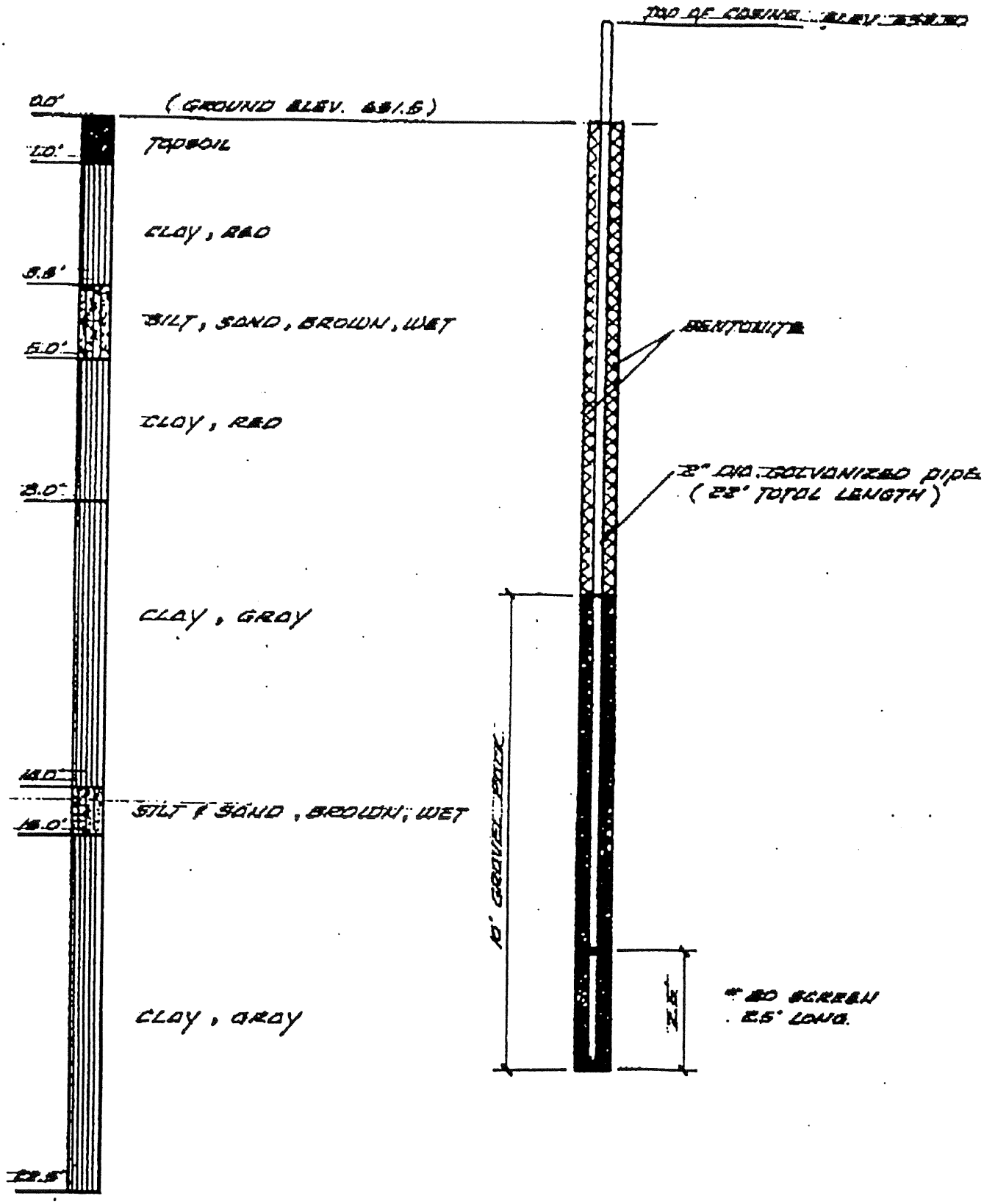
Monitor Well MW-2(2)
Detail MW-2R

LAIDLAW-COOPERSVILLE
Section 27, T.14W., R.8N.,
Polkton Township,
Ottawa County, Michigan

scale	as shown	date drawn	8/31/93
project mgr.	jms	revised	slv 8/31/93
Superior ENVIRONMENTAL CORP		drawn by	slv
			109209-03

MW-11

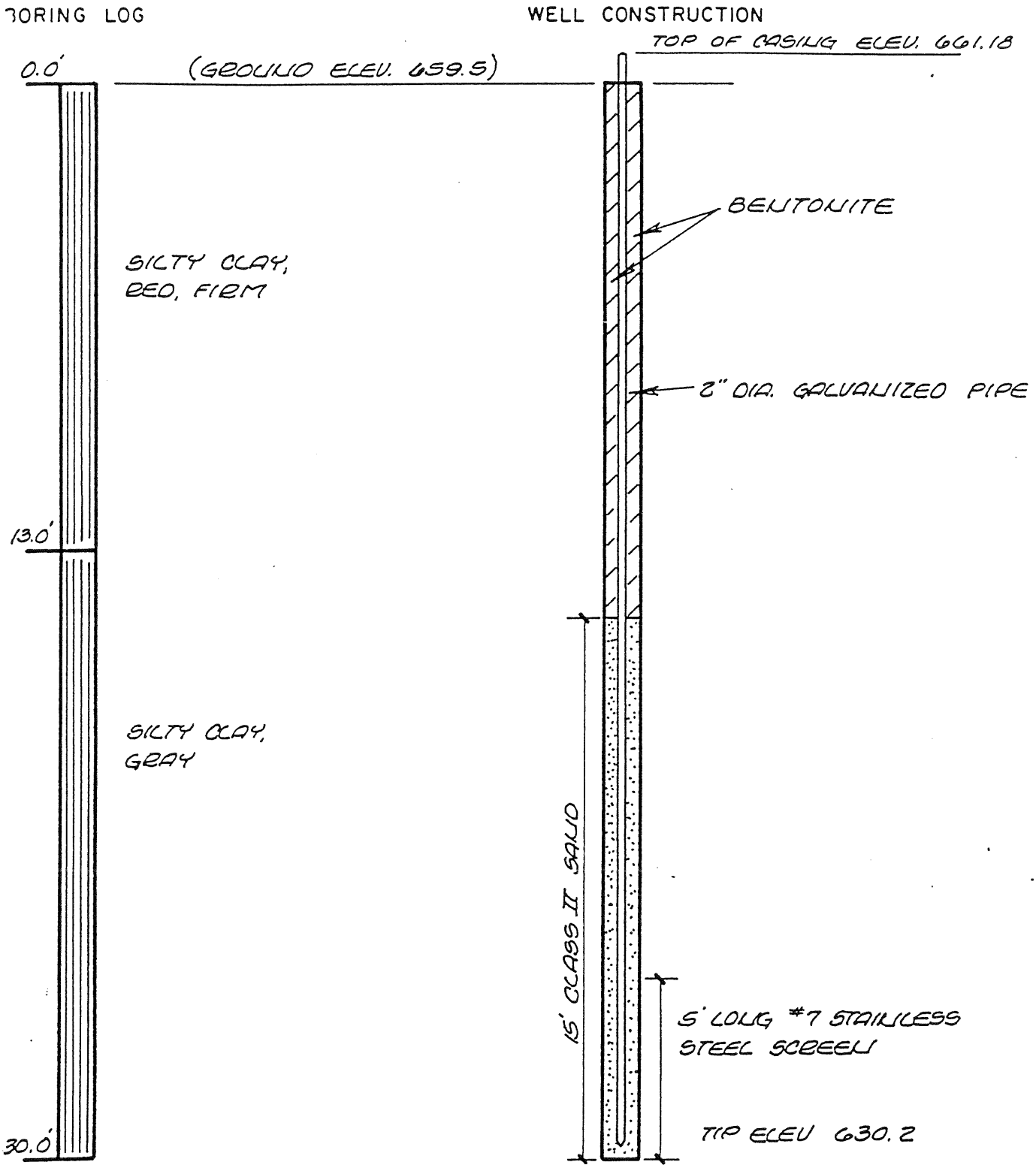
~~M-1004~~ OBSERVATION WELL

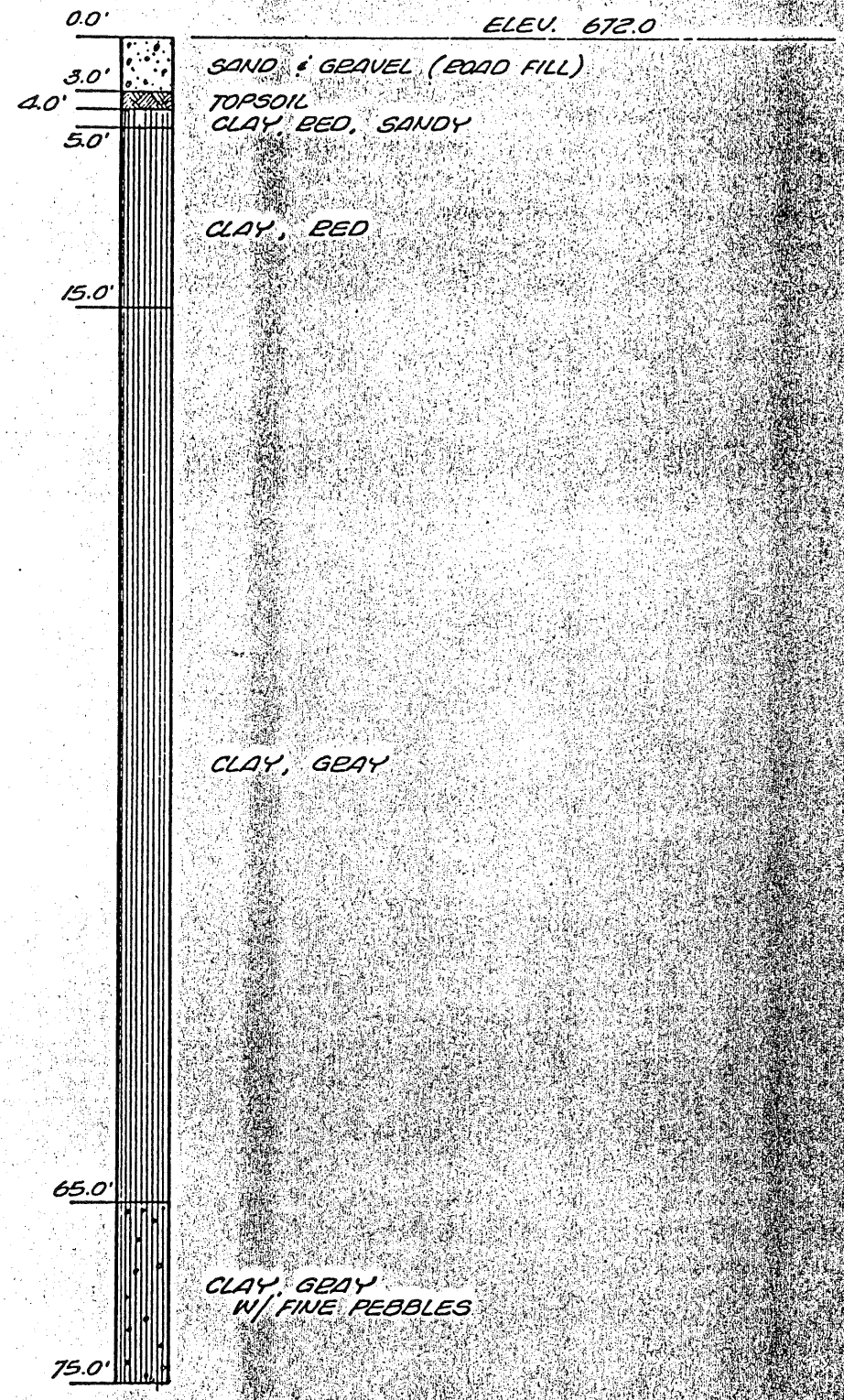


MW-12

CELL "E" OBSERVATION WELL - A12U

N 56+16 E 36+79

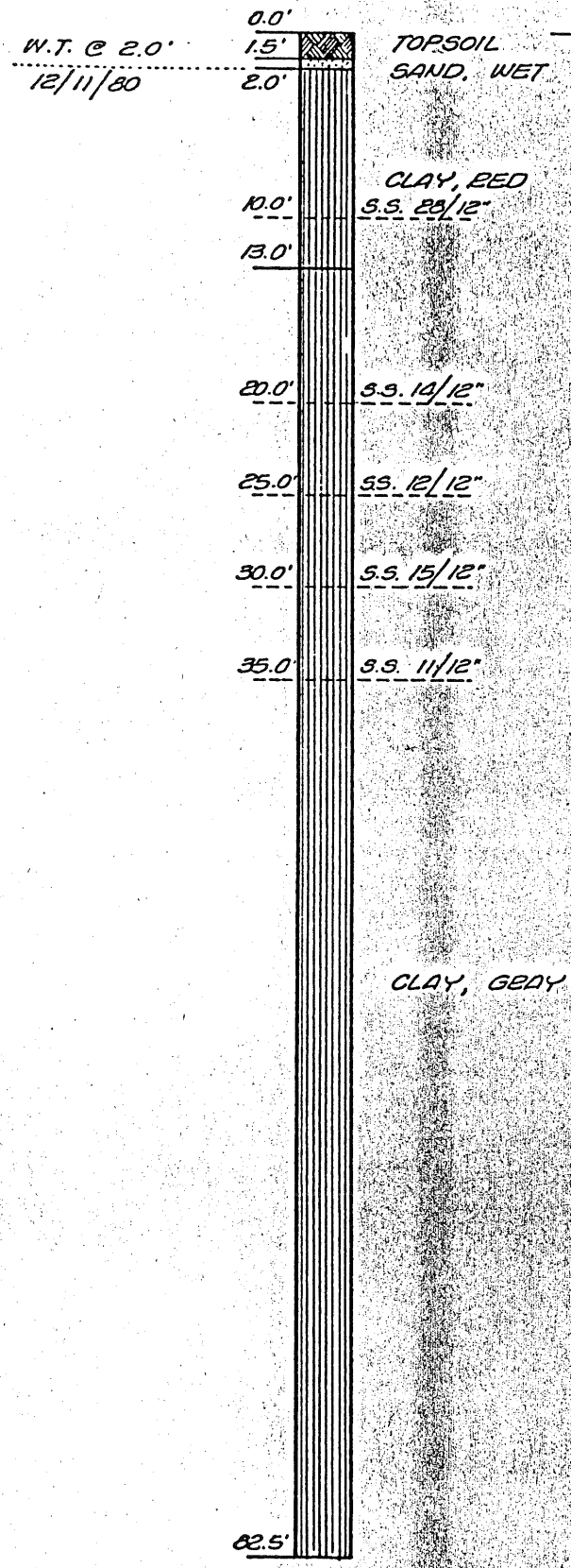




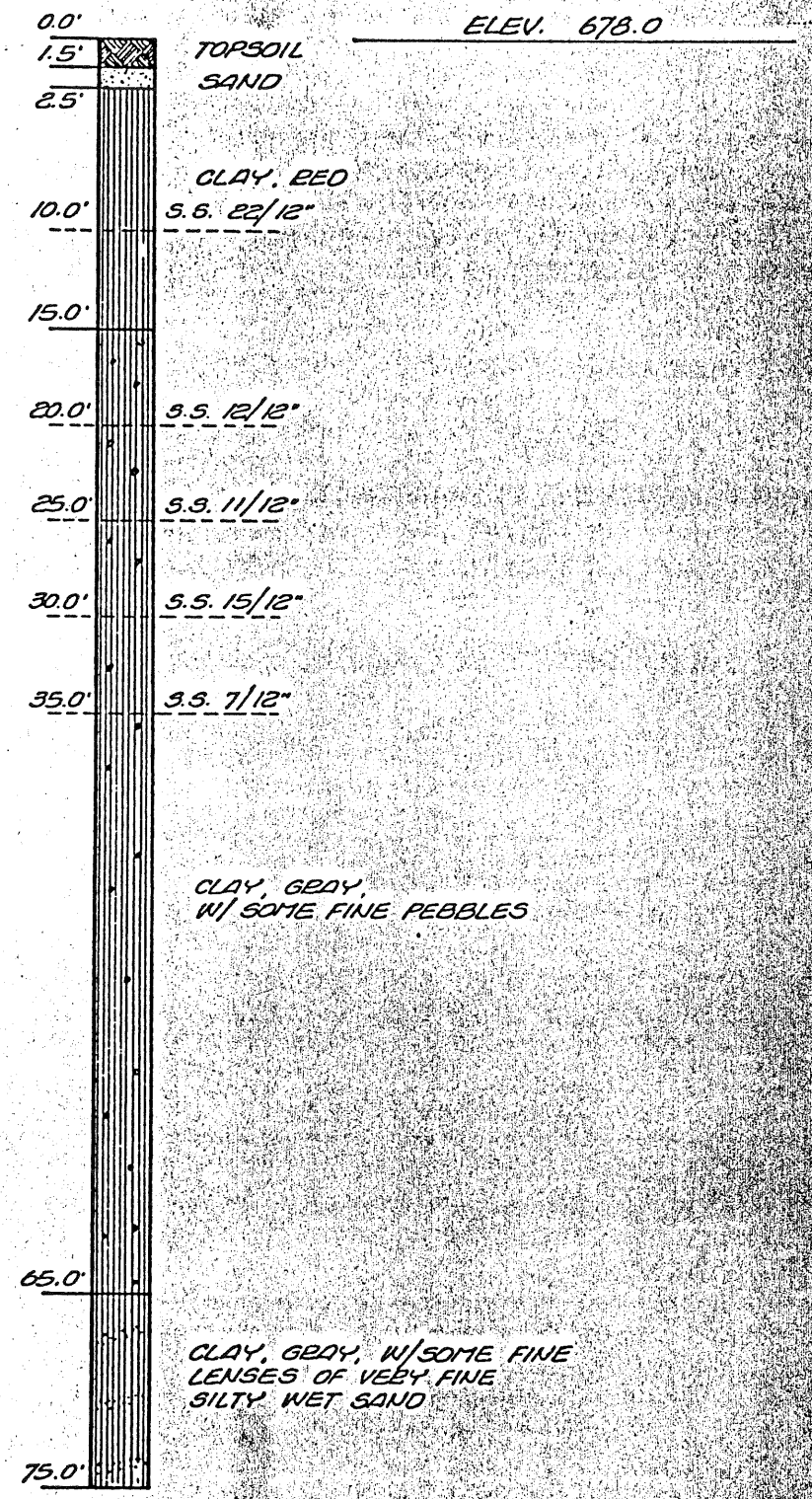
DRY HOLE 8/28/80

B-2 (N 44+30 - E 30)

ELEV. 676.5

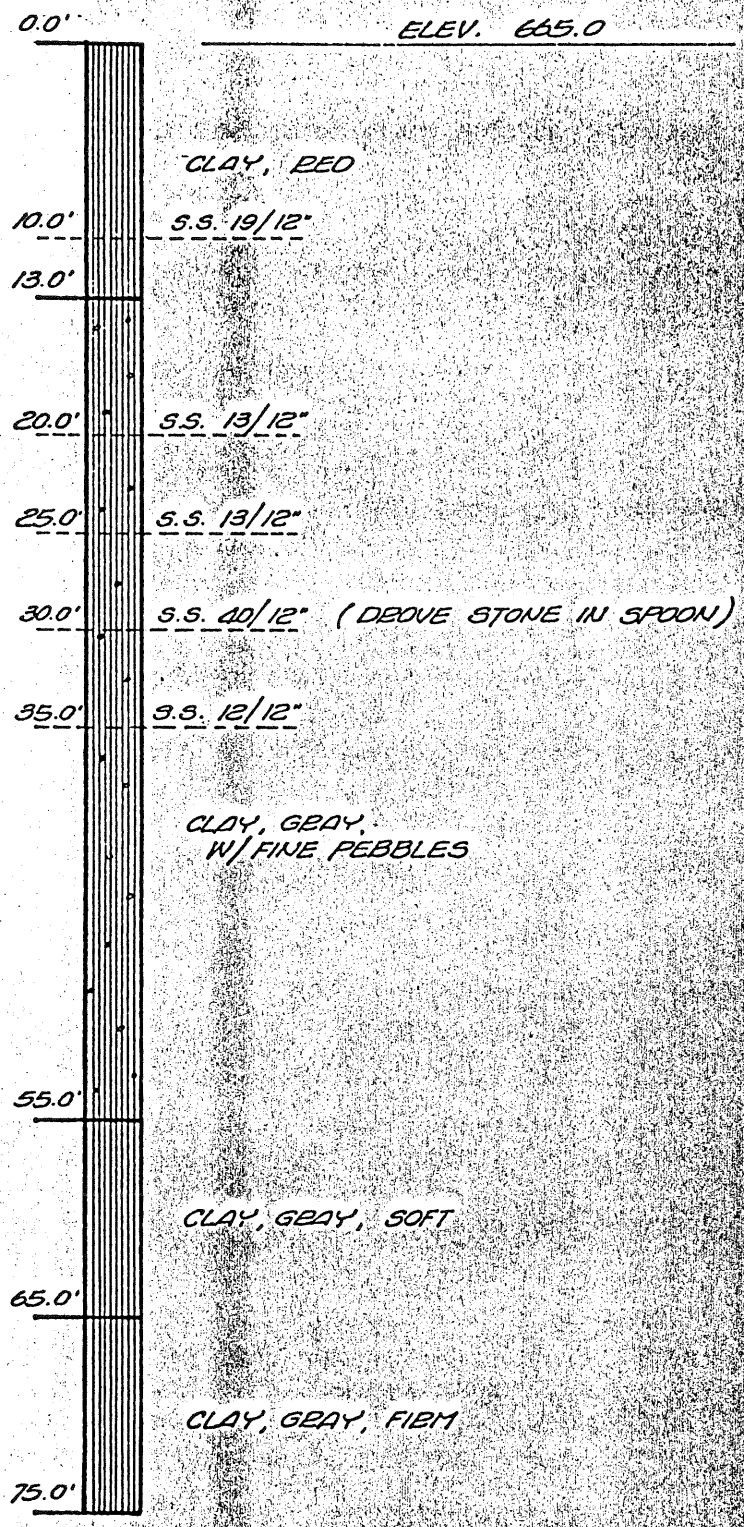


B-3 (N 50 - E 14)



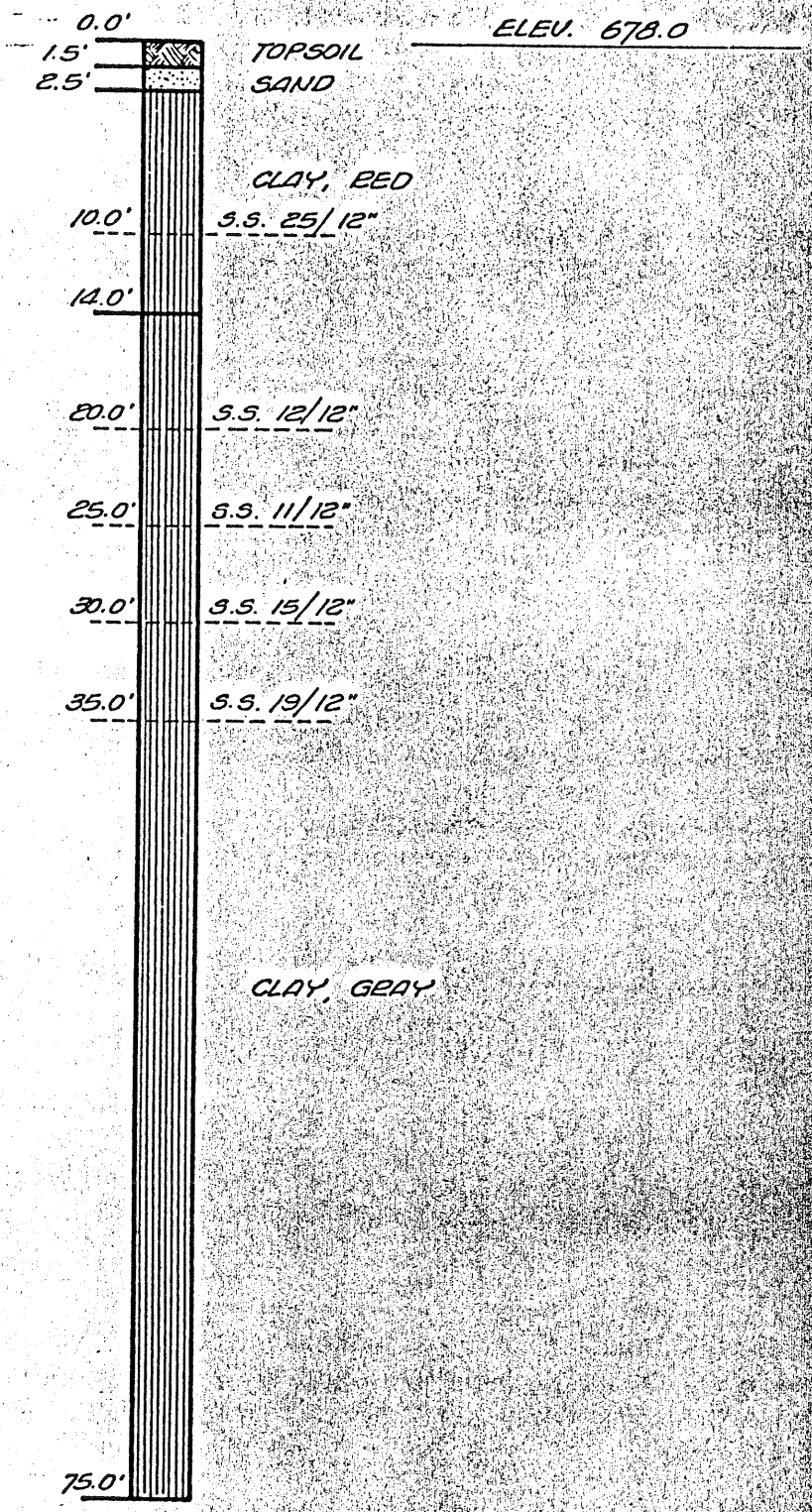
WATER STANDING @ 70'.
1 HOUR AFTER TERMINATION
OF BORING

B-4 (N 54 - E 20)



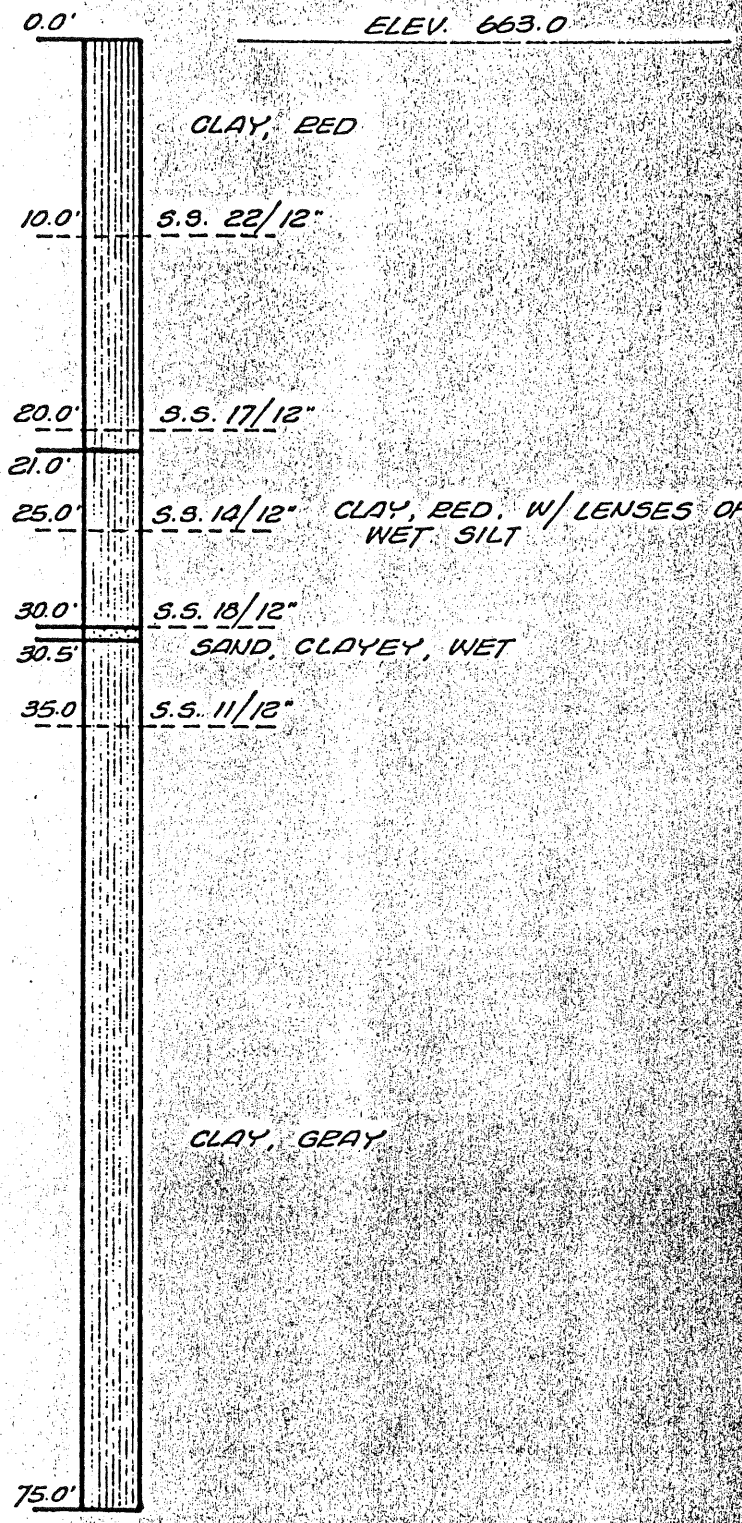
DRY HOLE 12/17/80

B-5 (N 58 - E 26)



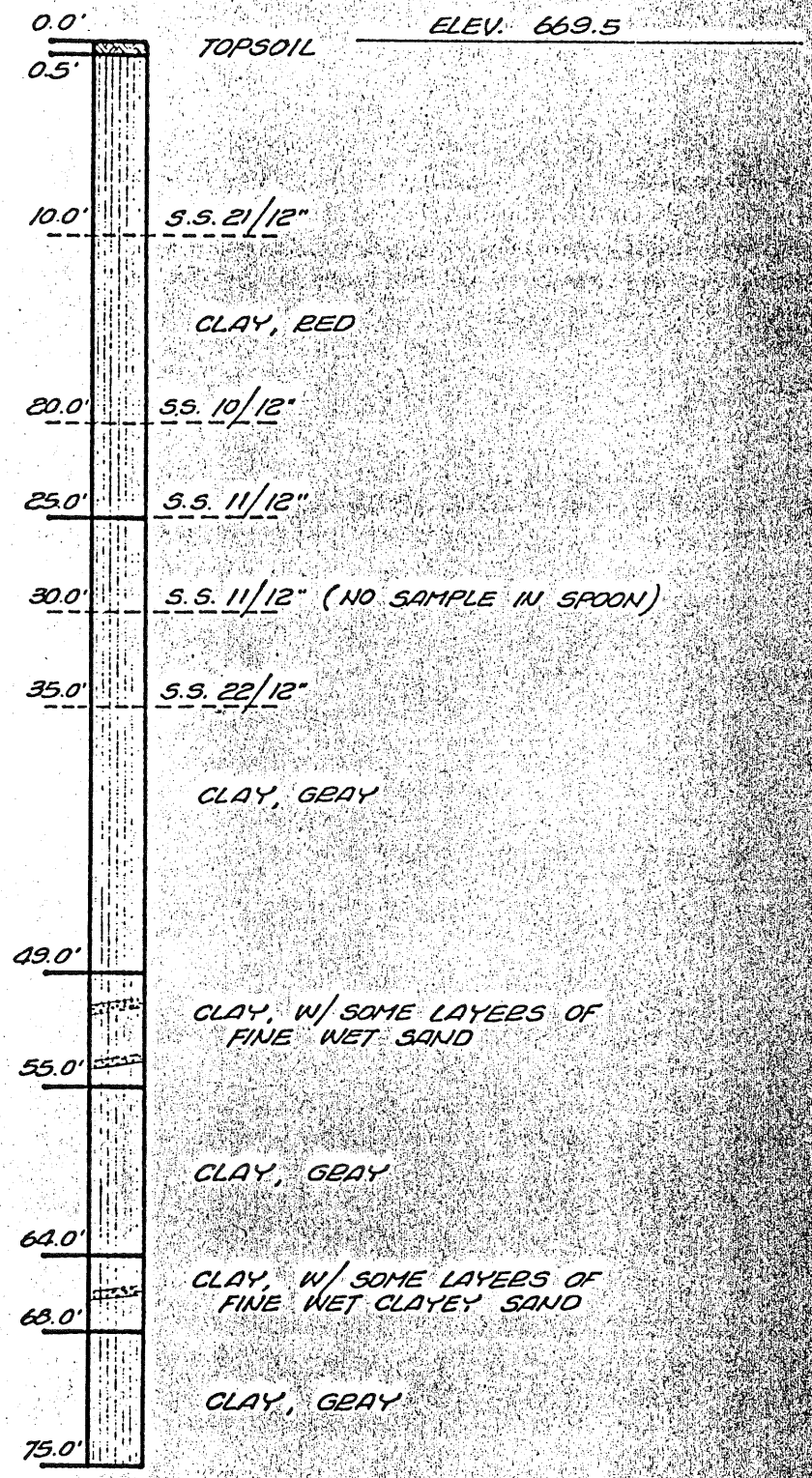
DRY HOLE 12/19/80

B-6 (N 48 - E 21+40)

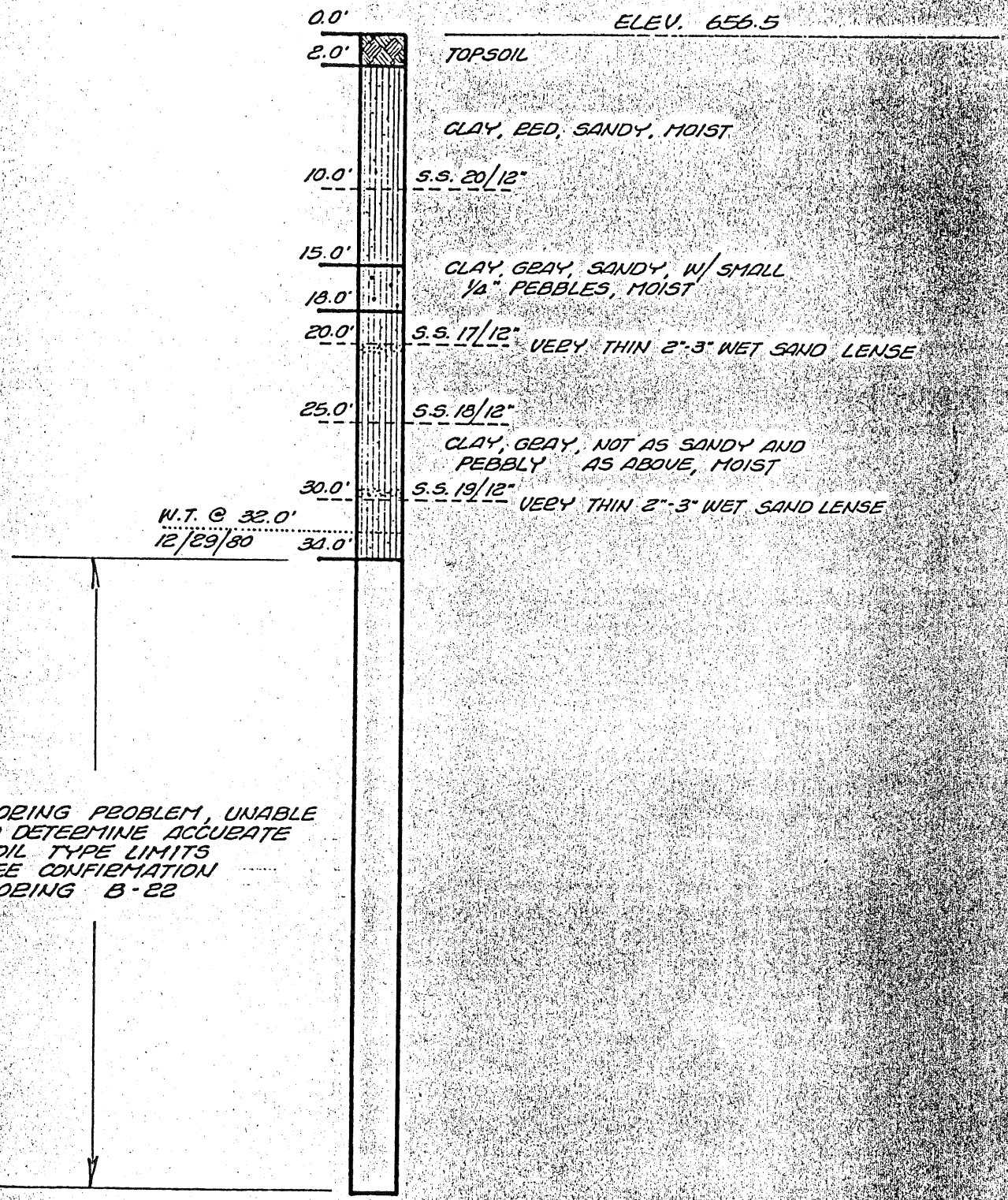


WET 21' TO 30.5' 12/19/80

B-7 (N 58 - E 30)

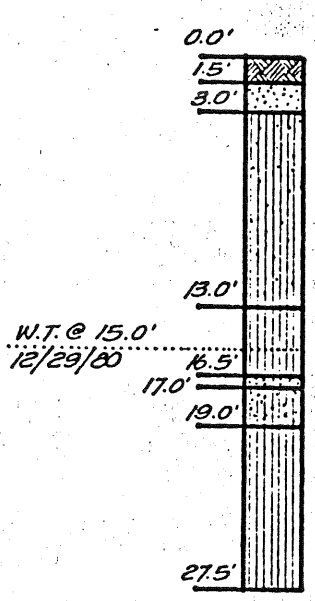

0.0'
TOPSOIL
ELEV. 669.5
0.5'
10.0'
S.S. 21/12"
CLAY, RED
20.0'
S.S. 10/12"
25.0'
S.S. 11/12"
30.0'
S.S. 11/12" (NO SAMPLE IN SPOON)
35.0'
S.S. 22/12"
CLAY, GRAY
49.0'
CLAY, W/ SOME LAYERS OF FINE WET SAND
55.0'
CLAY, GRAY
64.0'
CLAY, W/ SOME LAYERS OF FINE WET CLAYEY SAND
68.0'
CLAY, GRAY
75.0'

B-8 (N 50 - E 32)


0.0'
ELEV. 656.5
2.0'
TOPSOIL
CLAY, RED, SANDY, MOIST
10.0'
S.S. 20/12"
15.0'
CLAY, GRAY, SANDY, W/ SMALL
1/4" PEBBLES, MOIST
18.0'
20.0'
S.S. 17/12"
VERY THIN 2"-3" WET SAND LENSE
25.0'
S.S. 18/12"
CLAY, GRAY, NOT AS SANDY AND
PEBBLY AS ABOVE, MOIST
30.0'
S.S. 19/12"
VERY THIN 2"-3" WET SAND LENSE
W.T. @ 32.0'
12/29/80
34.0'
BORING PROBLEM, UNABLE
TO DETERMINE ACCURATE
SOIL TYPE LIMITS
SEE CONFIRMATION
BORING B-22

B-9 (N 68 - E 32)

ELEV. 658.5



TOPSOIL

SAND, FINE TO MED., BROWN, MOIST

CLAY, RED, SANDY, MOIST

CLAY, GRAY, MOIST

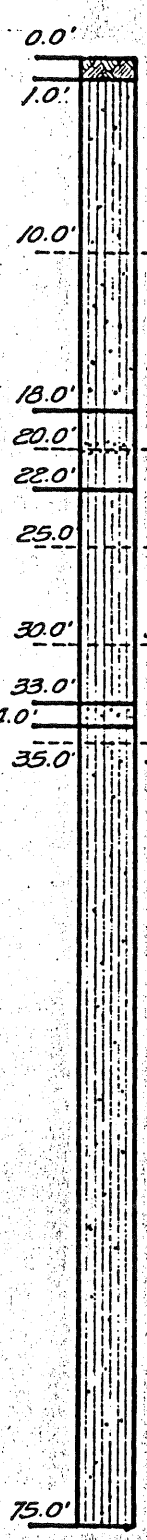
SAND, FINE TO MED., BROWN, WET

CLAY, GRAY, VERY SANDY, MOIST

CLAY, GRAY, MOIST

B-10 (N 66 - E 34)

ELEV. 670.0



TOPSOIL

S.S. 27/12"

CLAY, RED, SANDY, MOIST

CLAY, GRAY, SLIGHTLY SANDY AND PEBBLY, MOIST

S.S. 9/12"

(VERY THIN 1"-2" WET SAND LENSE @ 20')

S.S. 10/12"

CLAY, GRAY,

S.S. 14/12"

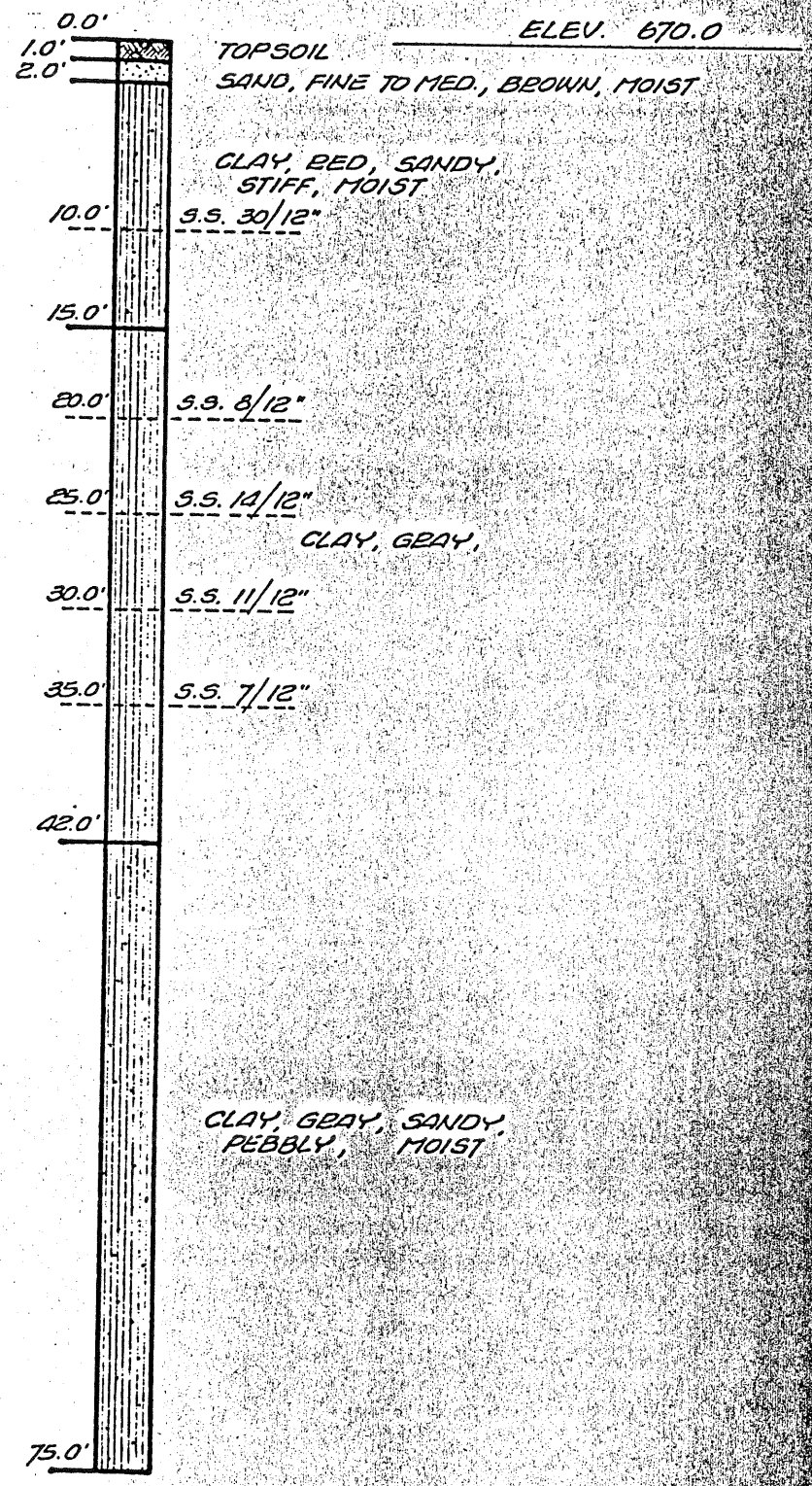
CLAY, GRAY, VERY SANDY, SMALL PIECES OF GREEN SANDSTONE, MOIST

S.S. 18/12"

CLAY, GRAY, SANDY, STIFF, MOIST

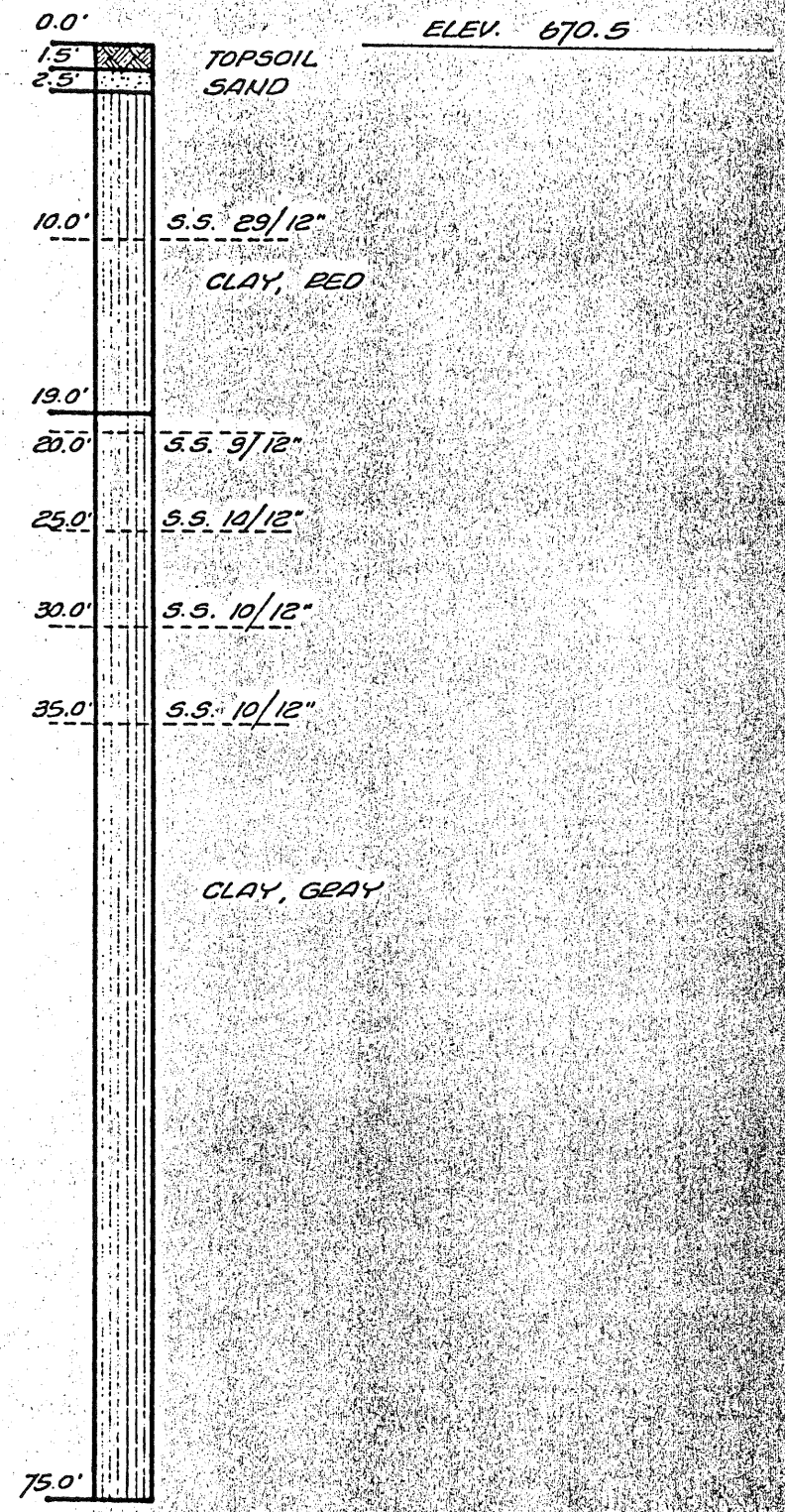
DRY HOLE 12/30/80

B-11 (N 58 - E 16)



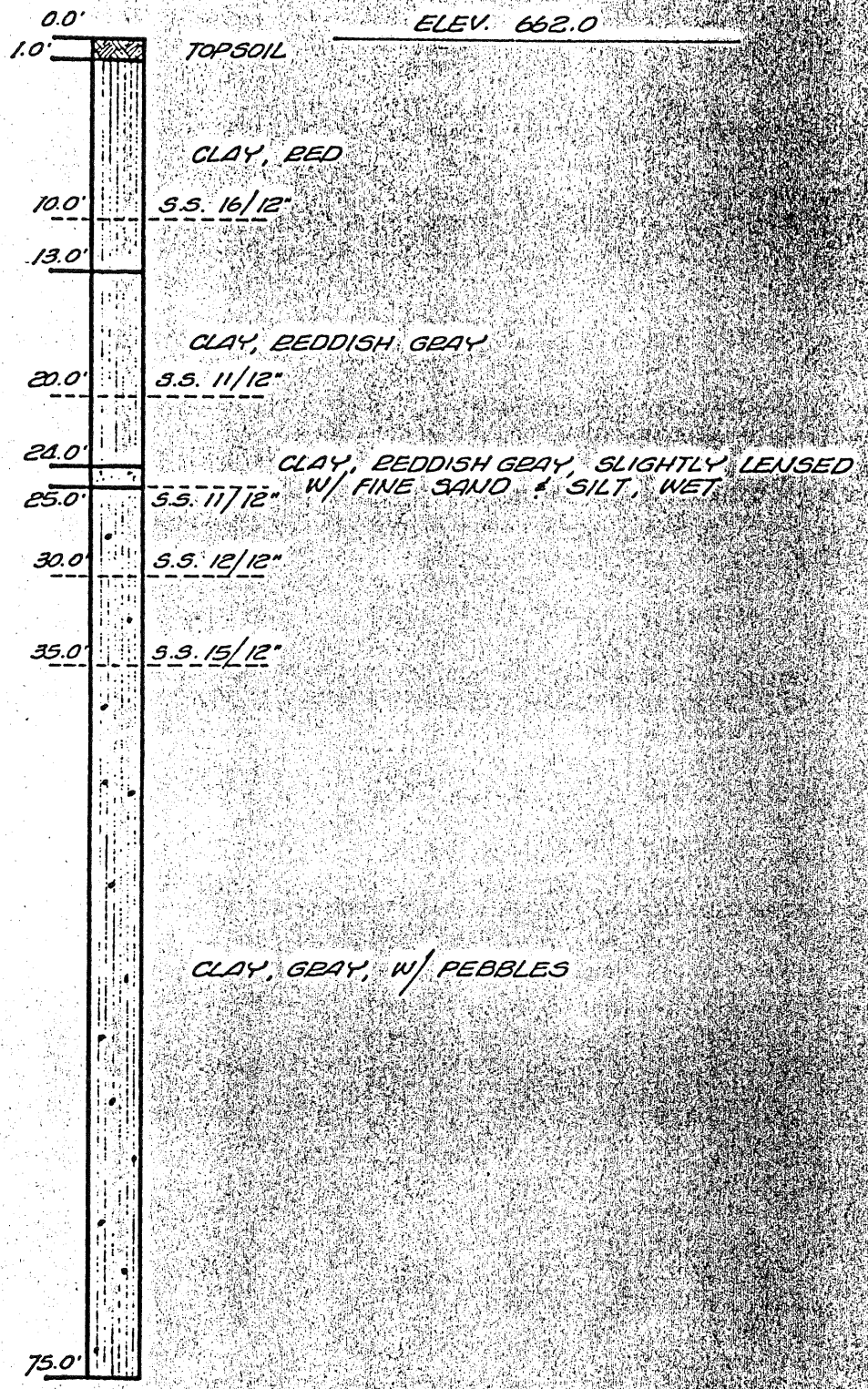
DRY HOLE 12/30/80

B-12 (N 64 - E 26)



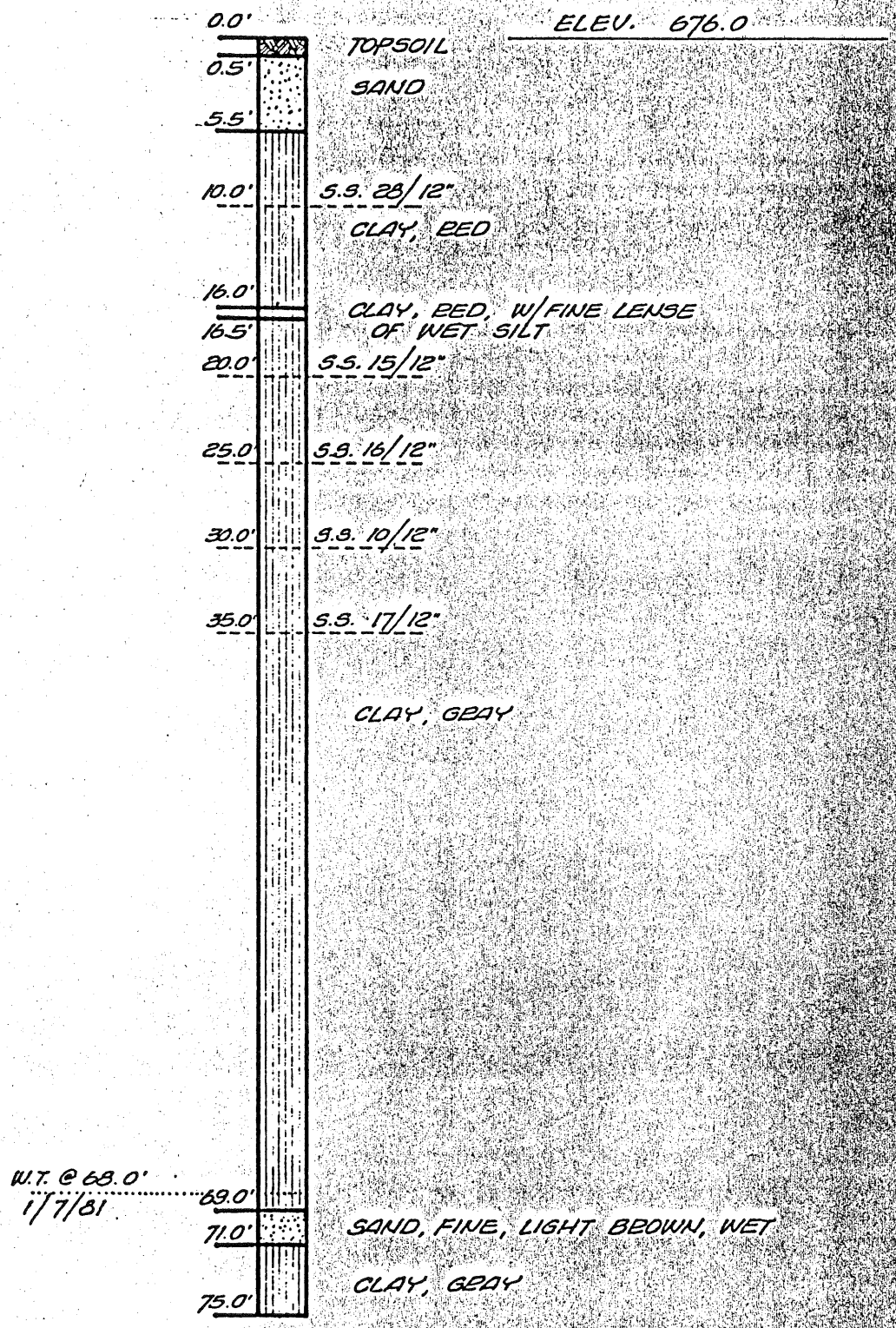
DRY HOLE 1/6/81

B-13 (N 66 - E 16)

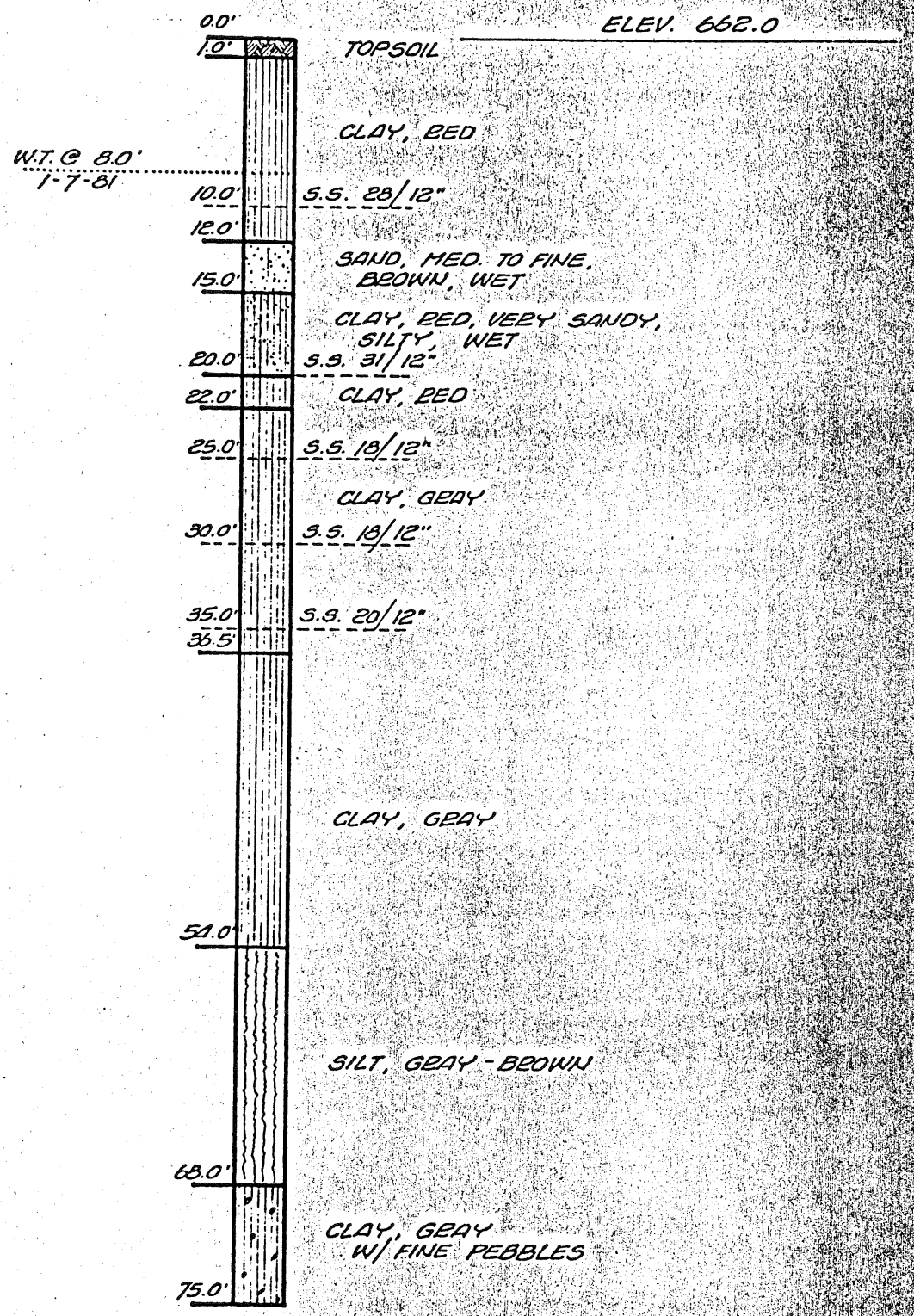


WET BETWEEN 24' & 25'
1/6/81

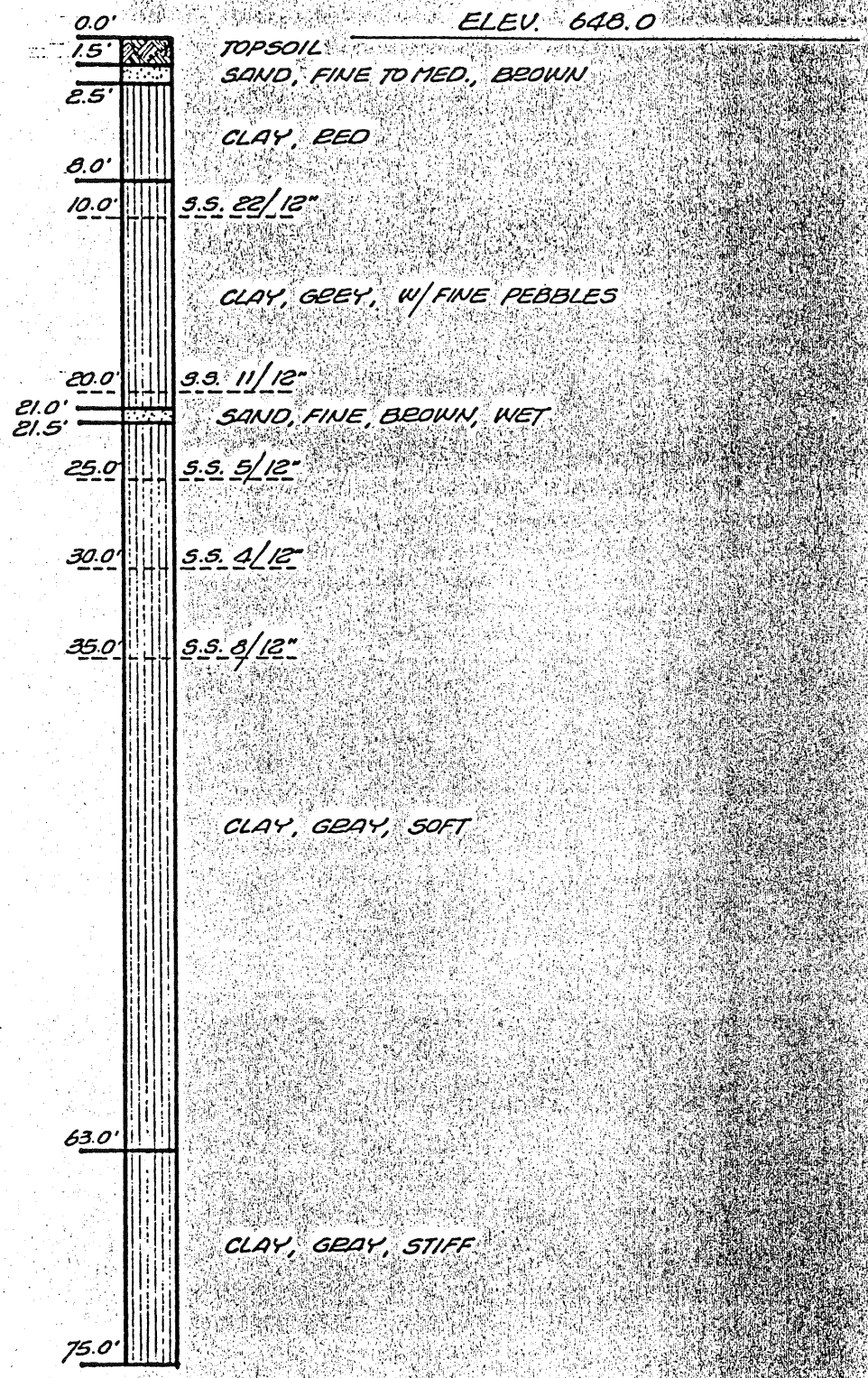
B-14 (N 68 - E 22)


0.0'
ELEV. 676.0
TOPSOIL
0.5'
SAND
5.5'
10.0'
S.S. 28/12"
CLAY, RED
16.0'
CLAY, RED, W/FINE LENSE OF WET SILT
16.5'
20.0'
S.S. 15/12"
25.0'
S.S. 16/12"
30.0'
S.S. 10/12"
35.0'
S.S. 17/12"
CLAY, GRAY
W.T. @ 68.0'
1/7/81
69.0'
71.0'
SAND, FINE, LIGHT BROWN, WET
CLAY, GRAY
75.0'

B-15 (N 62 - E 22)


0.0'
ELEV. 662.0
1.0'
TOPSOIL
CLAY, RED
W.T. @ 8.0'
1-7-81
10.0'
S.S. 28/12"
12.0'
SAND, MED. TO FINE, BROWN, WET
15.0'
CLAY, RED, VERY SANDY, SILTY, WET
20.0'
S.S. 31/12"
22.0'
CLAY, RED
25.0'
S.S. 18/12"
CLAY, GRAY
30.0'
S.S. 18/12"
35.0'
S.S. 20/12"
36.5'
CLAY, GRAY
54.0'
SILT, GRAY-BROWN
68.0'
CLAY, GRAY W/ FINE PEBBLES
75.0'

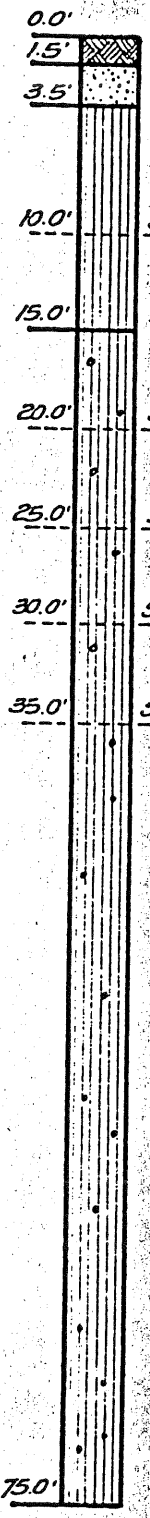
B-16 (N 62 - E 30)



WET BETWEEN 21.0' & 21.5'
1/8/81

B-17 (N 66- E 42)

ELEV. 656.0



TOPSOIL

SAND, FINE, BROWN, WET

CLAY, RED

S.S. 17/12"

S.S. 18/12"

S.S. 13/12"

S.S. 13/12"

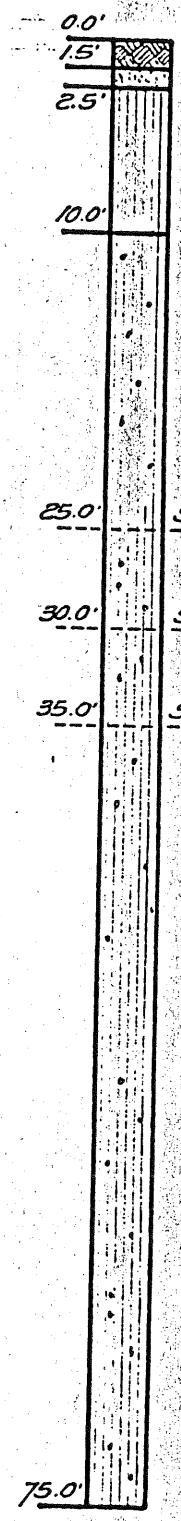
S.S. 13/12"

CLAY, GRAY,
SOME FINE PEBBLES

DRY HOLE 1/23/81

B-18 (N 70 - E 32)

ELEV. 655.0



TOPSOIL

SAND, FINE TO MED., LIGHT BROWN, WET

CLAY, RED

S.T. 23/12"

S.T. 44/12"

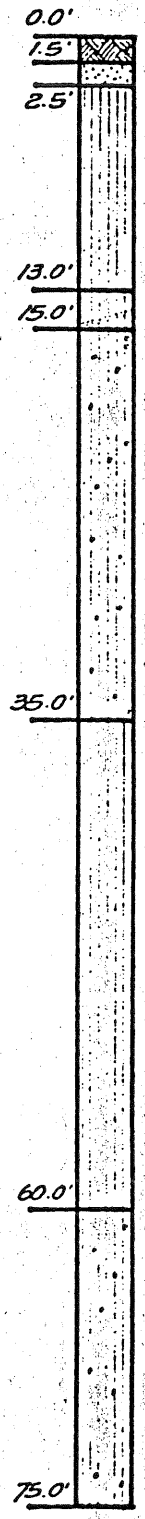
S.T. 30/12" (NO SAMPLE)

CLAY, GRAY, W/FINE PEBBLES

WET BETWEEN 1.5' & 2.5'
11/28/81

B-19 (N 68 - E 36)

ELEV. 655.0



TOPSOIL

SAND, MED. TO FINE, BROWN, WET

CLAY, RED

CLAY W/LAYER OF WET SAND
(AUGERED OUT WET SLURRY GRITTY CLAY)

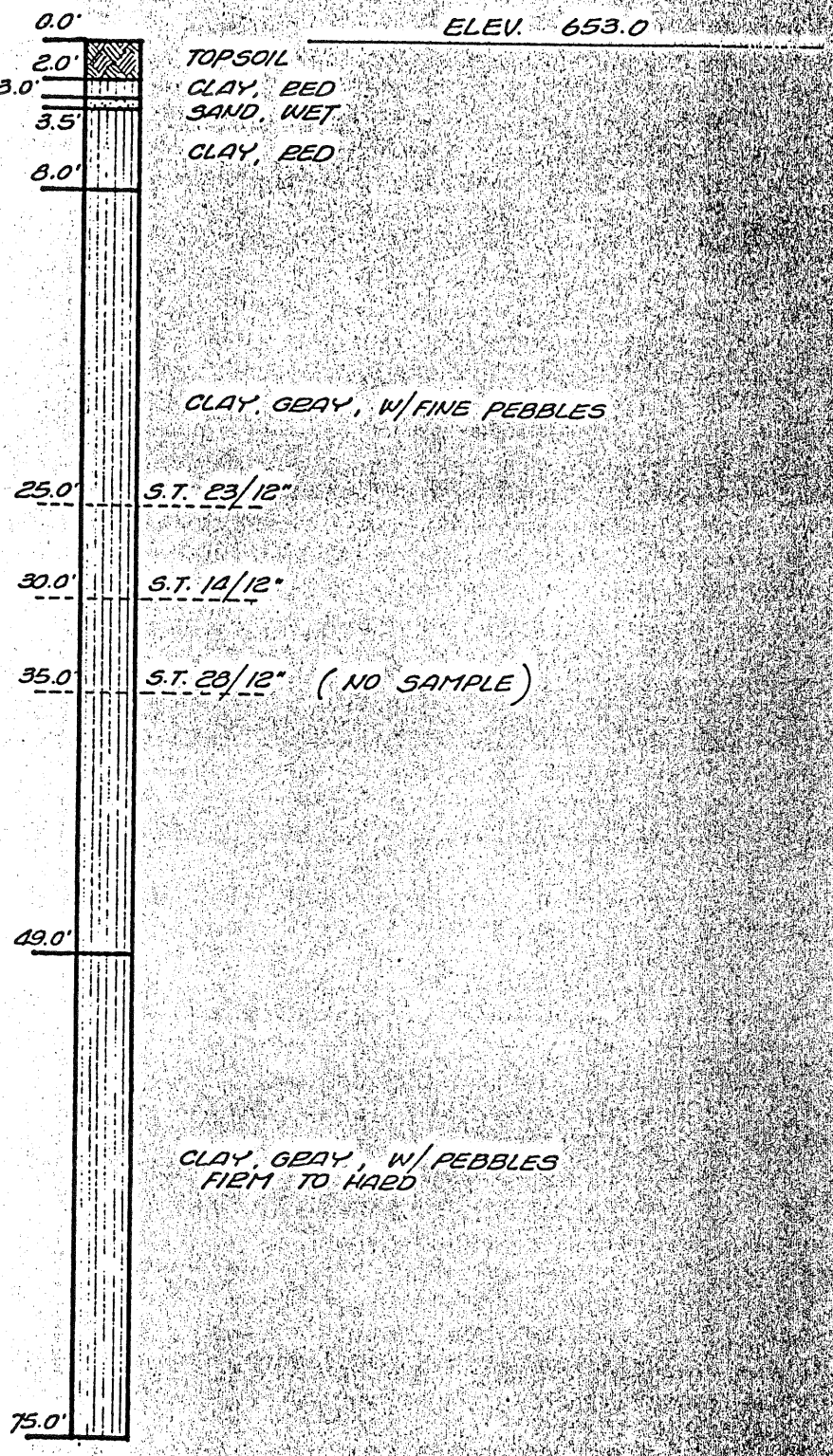
CLAY, GRAY,
W/ FINE PEBBLES

CLAY, GRAY, SOFT

CLAY, GRAY, SOME FINE
PEBBLES, FIRM

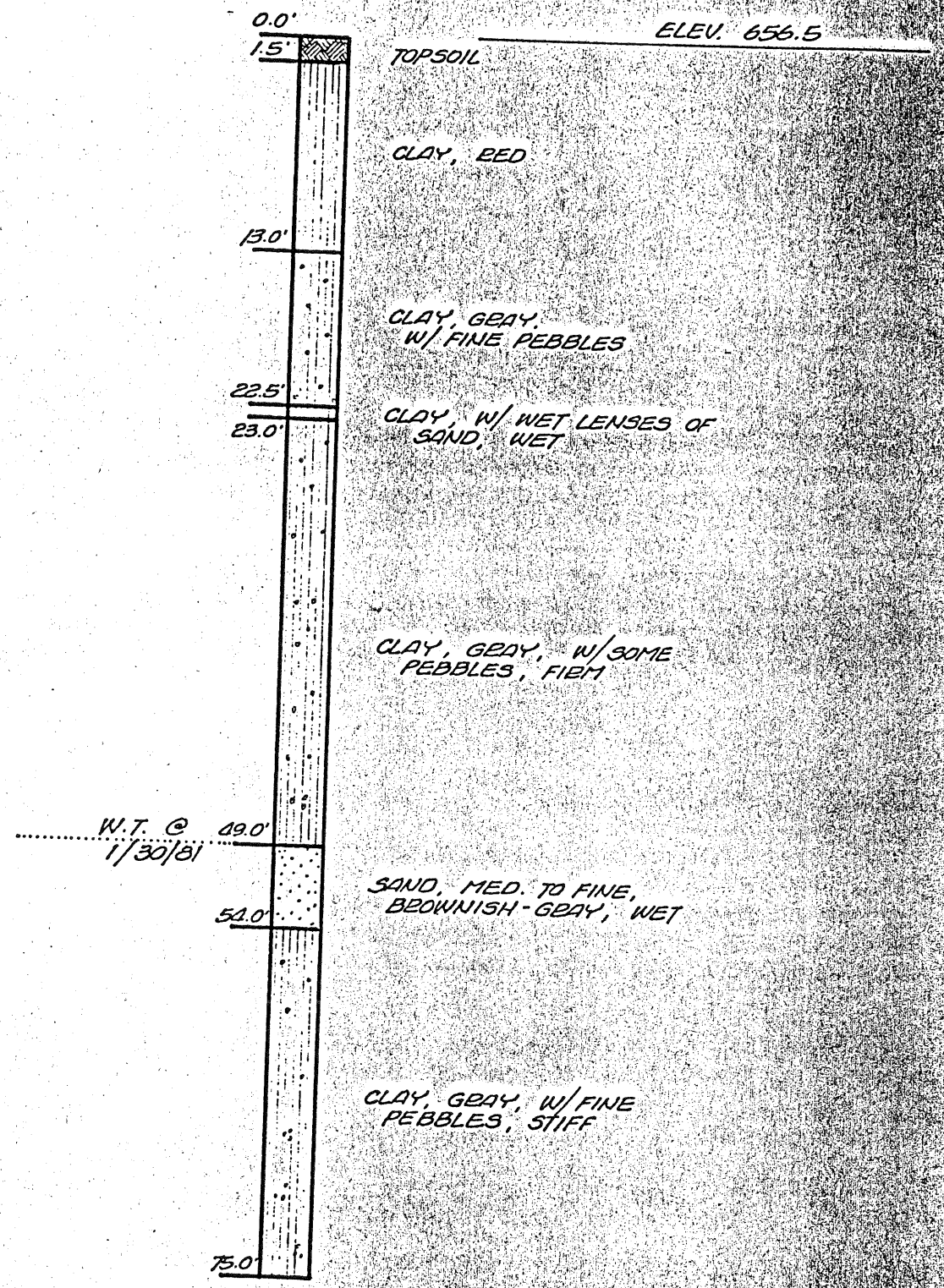
WET BETWEEN 13' & 15'
1/28/81

B-20 (N 68 - E 34)



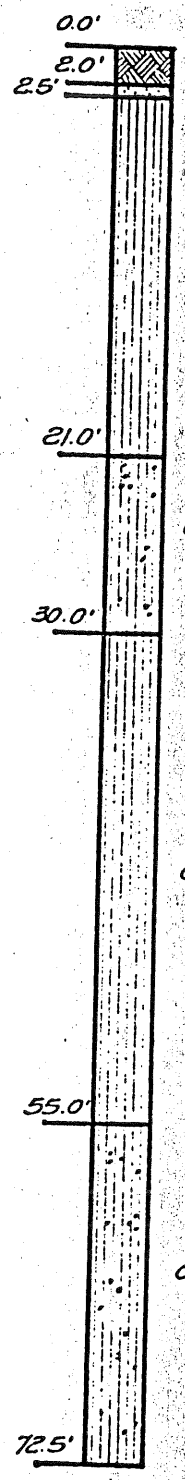
WET BETWEEN 3.0' & 3.5'
1/30/81

B-21 (N 60 - E 40)



B-22 (N 68-E 31+90)

ELEV. 657.5



TOPSOIL

SAND, FINE, BROWN

CLAY, RED

CLAY, GRAY, PEBBLY, FIRM

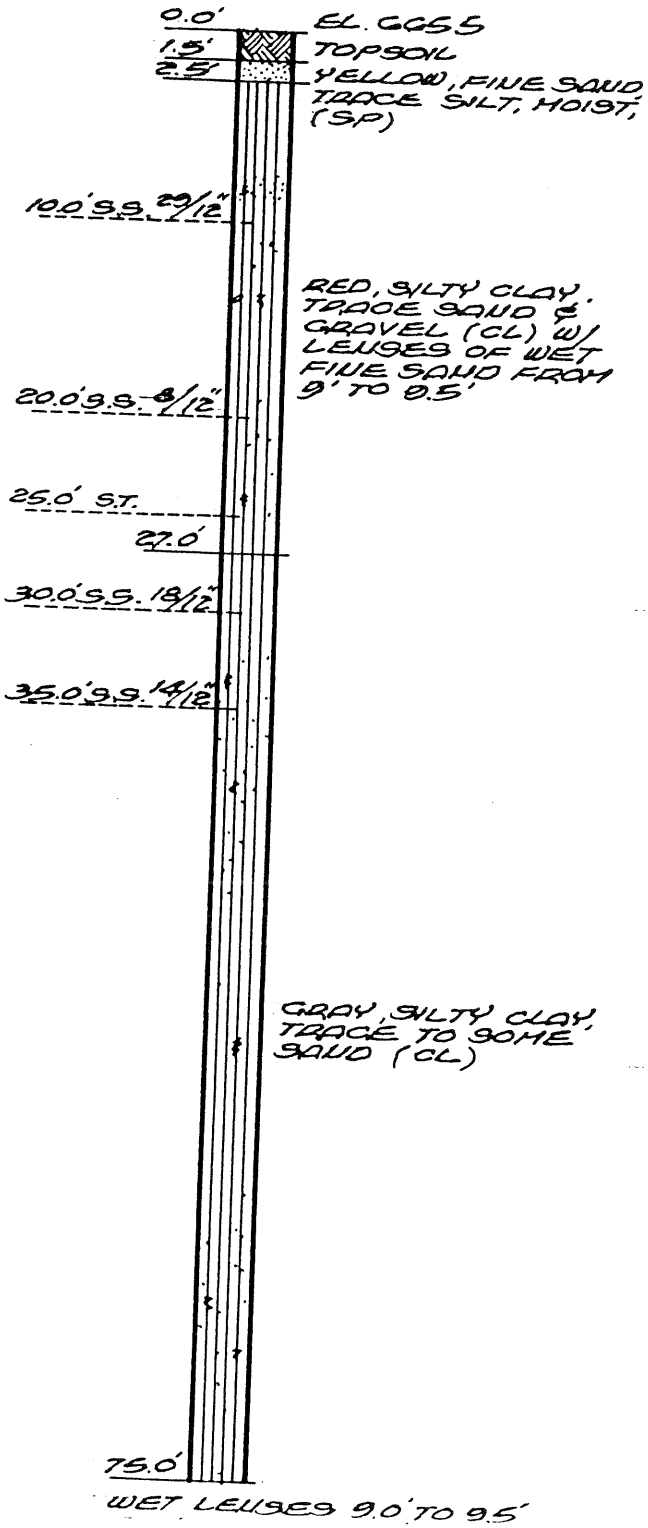
CLAY, GRAY, SOFT

CLAY, GRAY, PEBBLY, FIRM TO STIFF

NO WATER STANDING AT TERMINATION OF BORING 2/4/81

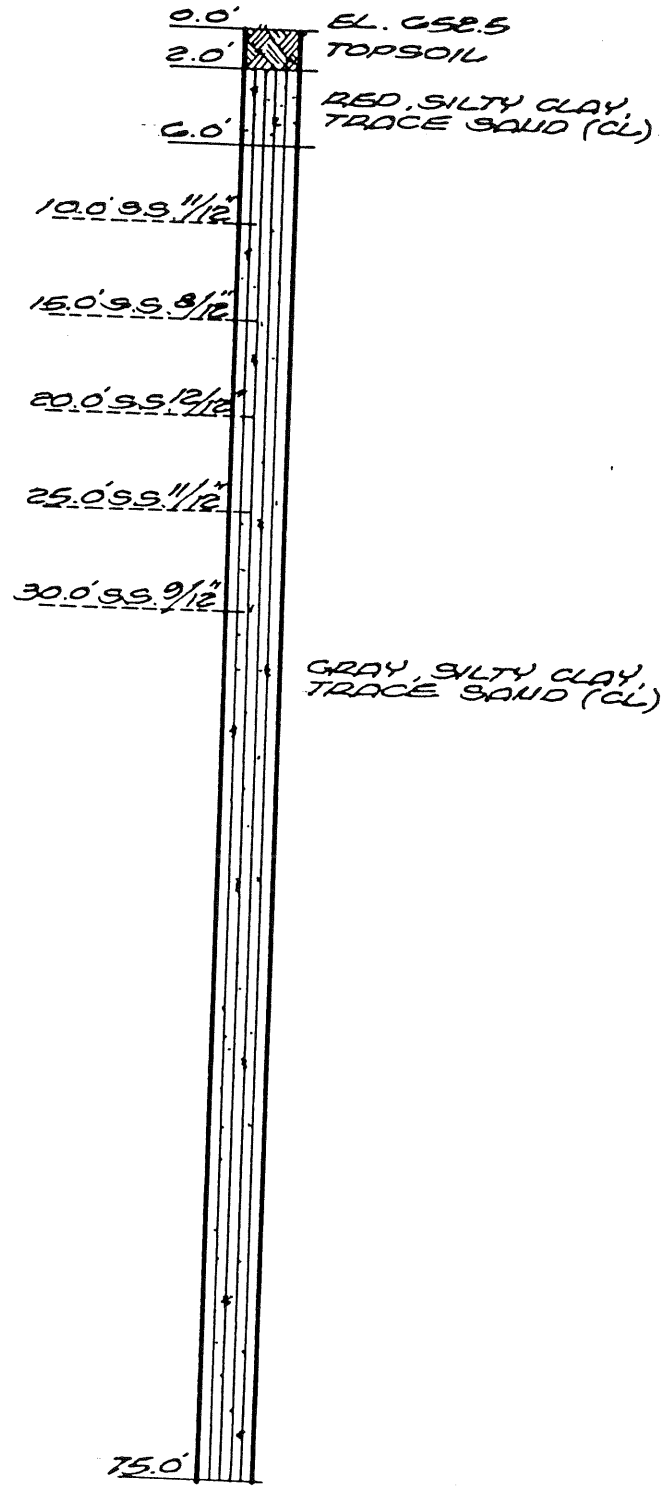
B-25 (N 70 - E 29)

B-88-1 (N.46 - E.38)



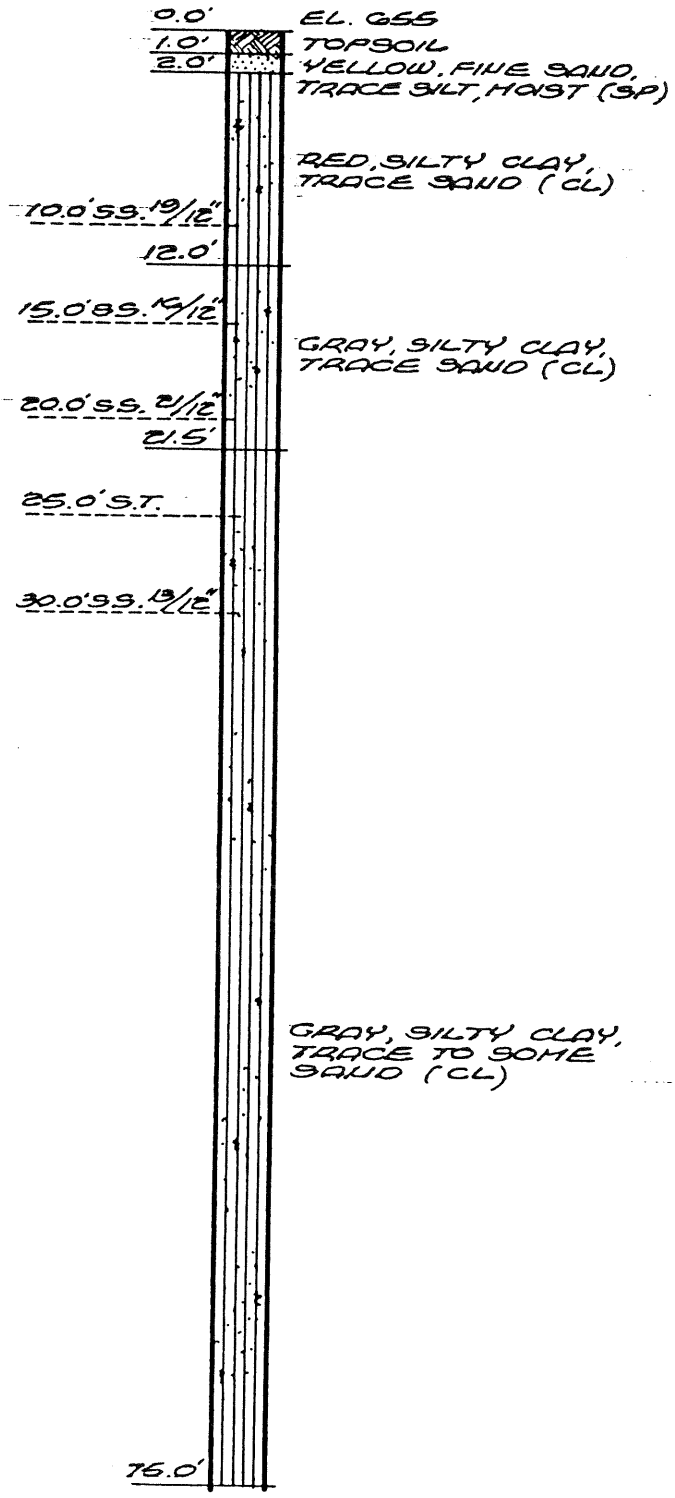
WET LENSES 9.0' TO 9.5'

B-88-2 (N.48 - E.43+60)



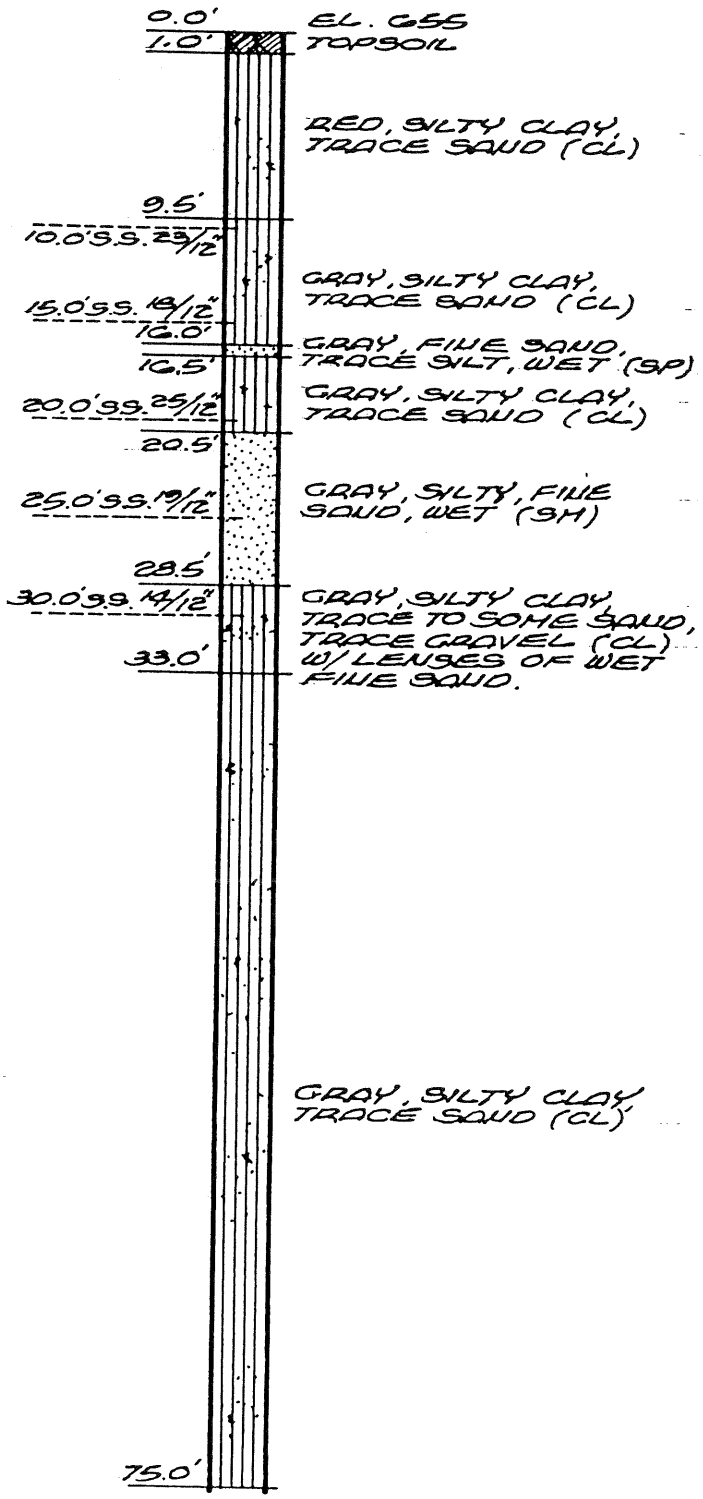
DRY HOLE

B-88-3 (N.56 - E.42)



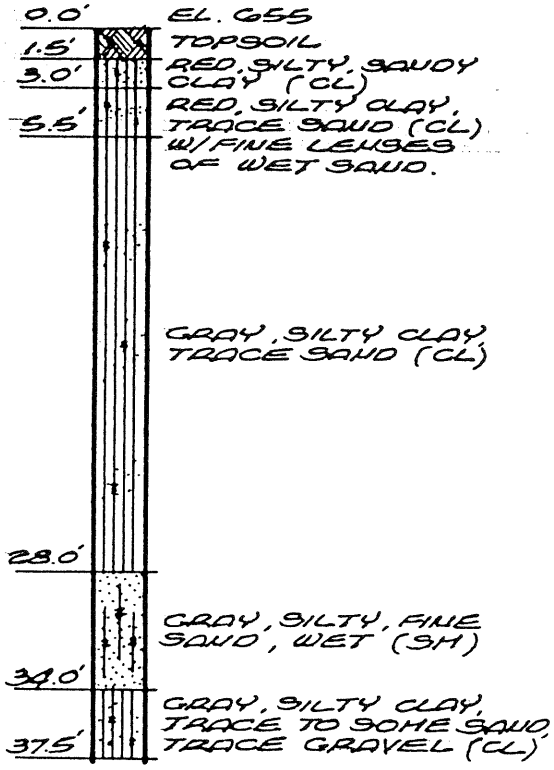
WET FROM 1' TO 2'

B-88-4 (N.58 - E.42)



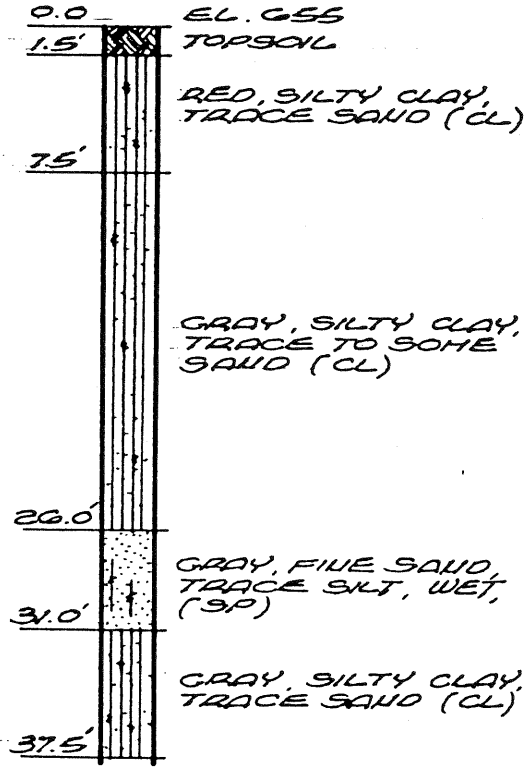
WET BETWEEN 8.0' TO 8.5'

B-88-4A (N.57+50 - E.42)



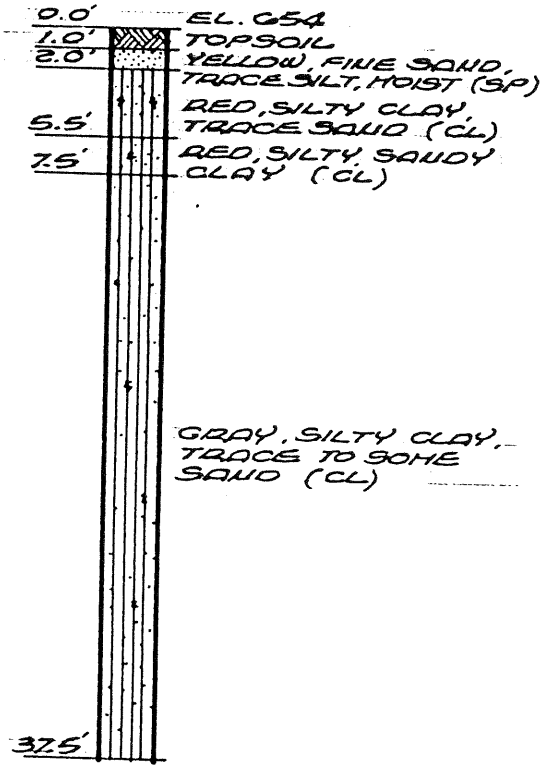
WET BETWEEN 28' & 34'
OTHERWISE DRY HOLE
5-10-88

B-88-4B (N.58+50 - E.42)



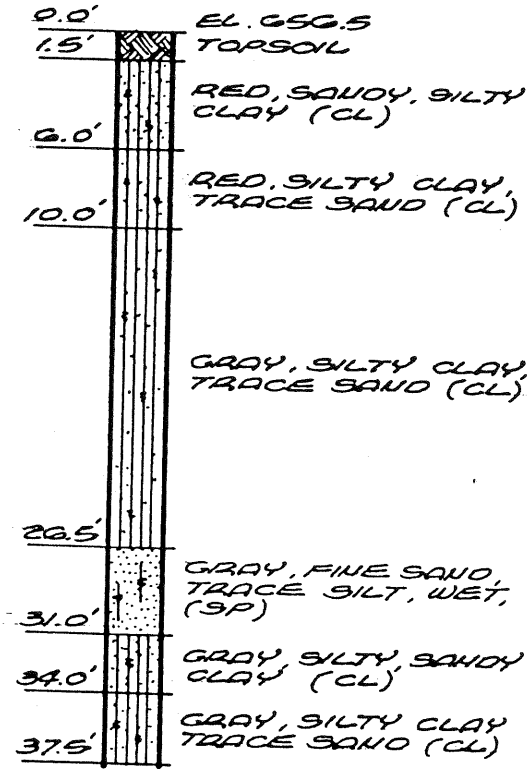
WET BETWEEN 26.0' - 31'
OTHERWISE DRY HOLE
5-10-88

B-88-4C (N.58 - E.42+50)



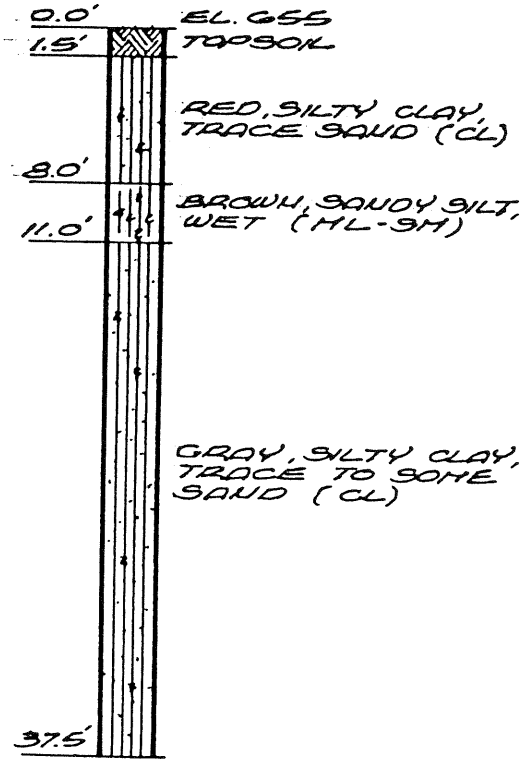
SEEPAGE 2.0' TO 5.5'
OTHERWISE DRY HOLE
5-10-88

B-88-4D (N.58 - E.41+50)



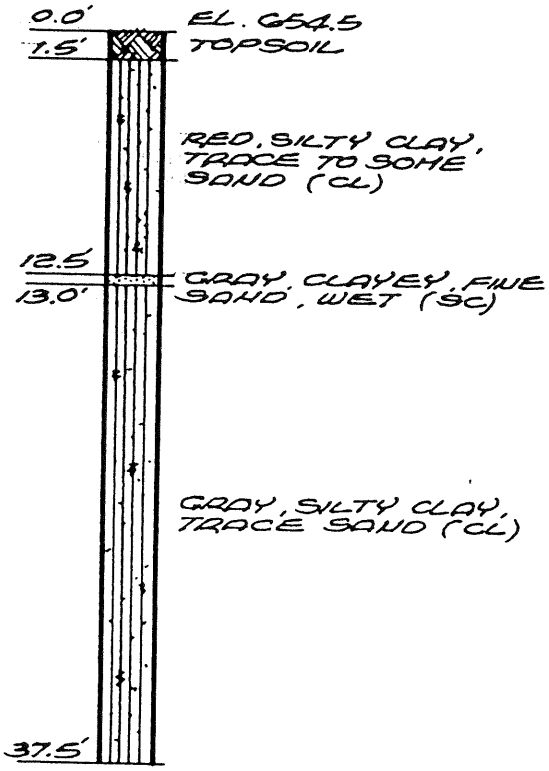
WET BETWEEN 26' & 34'
5-10-88

B-88-4E (N.57-E.42)



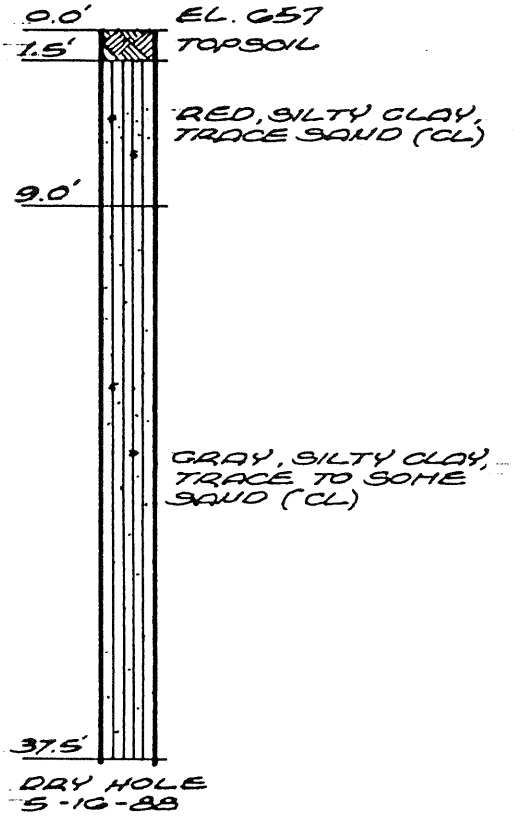
WET BETWEEN 8' & 11'
5-10-88

B-88-4F (N.59-E.42)

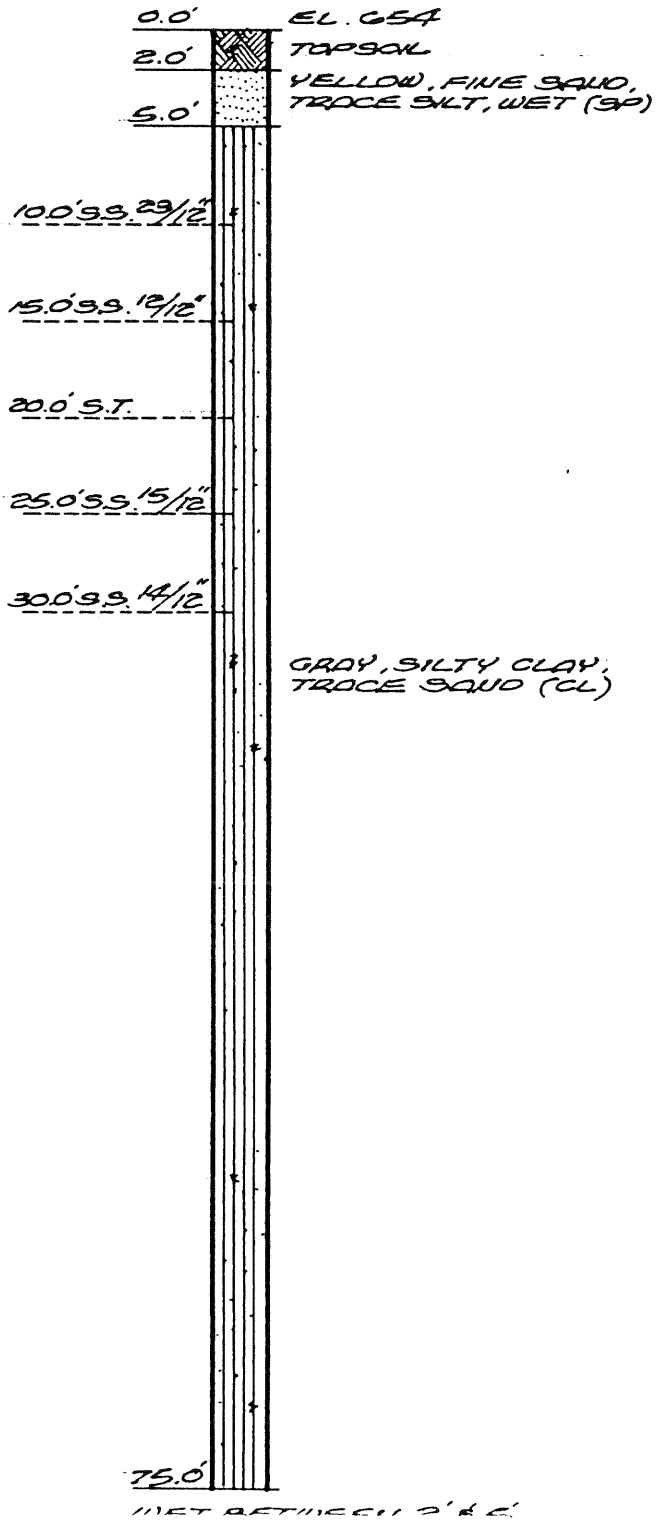


WET BETWEEN 12.5' TO 13'
5-10-88

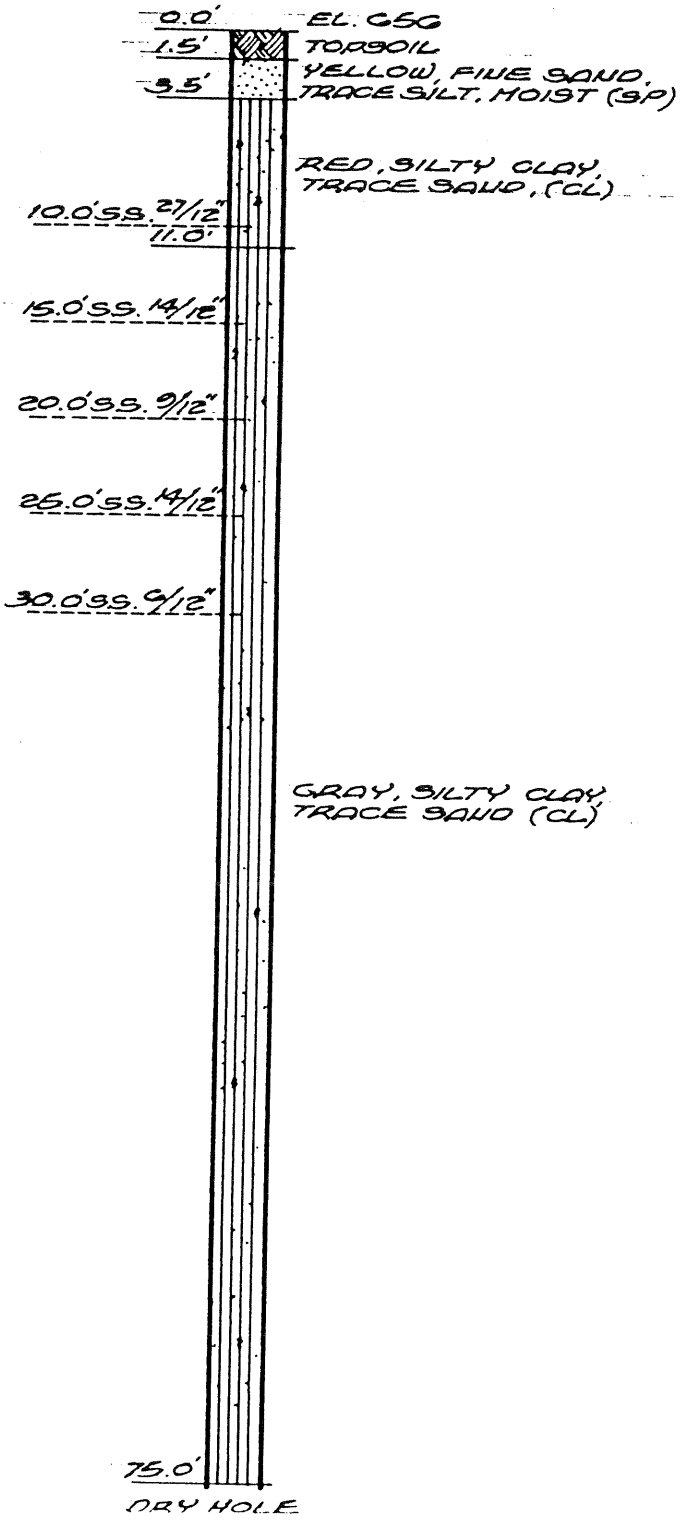
B-88-4G (N.58 - E.41)



B-88-5 (N.50 - E.50)

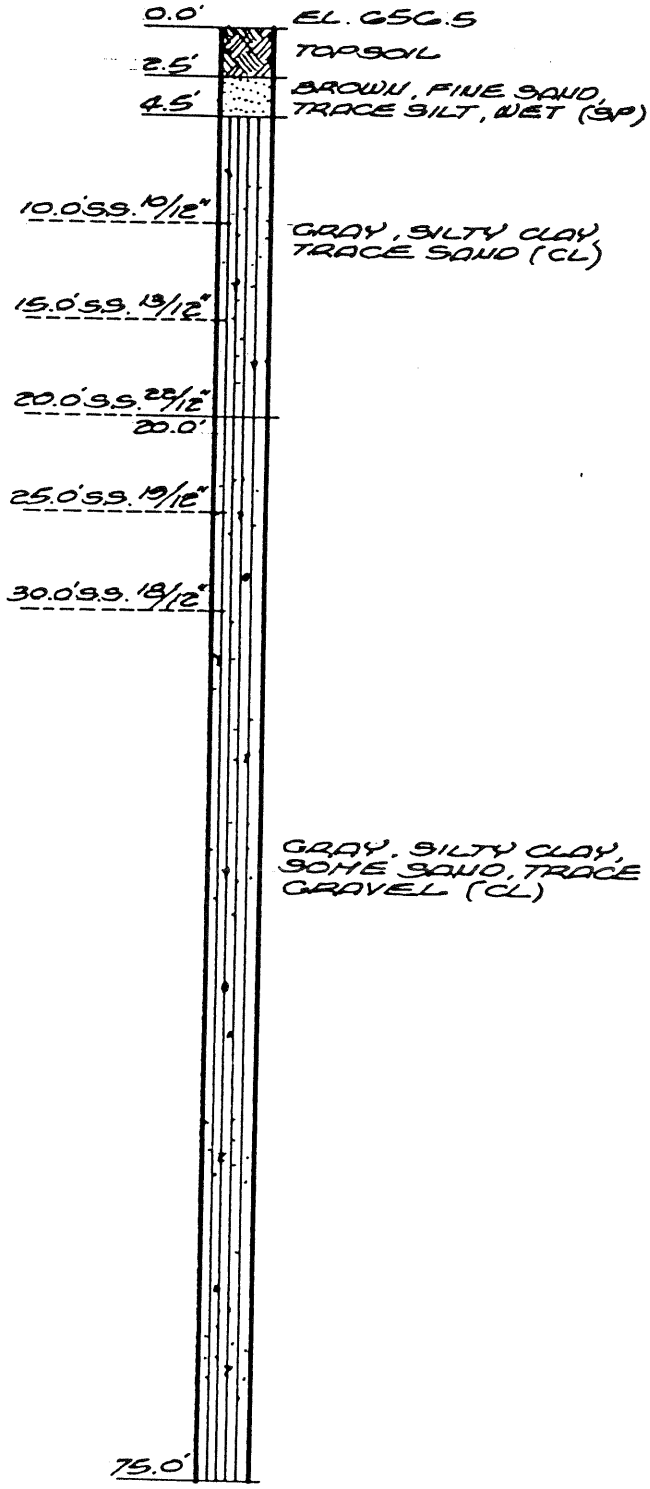


B-88-6 (N.52 - E.50)



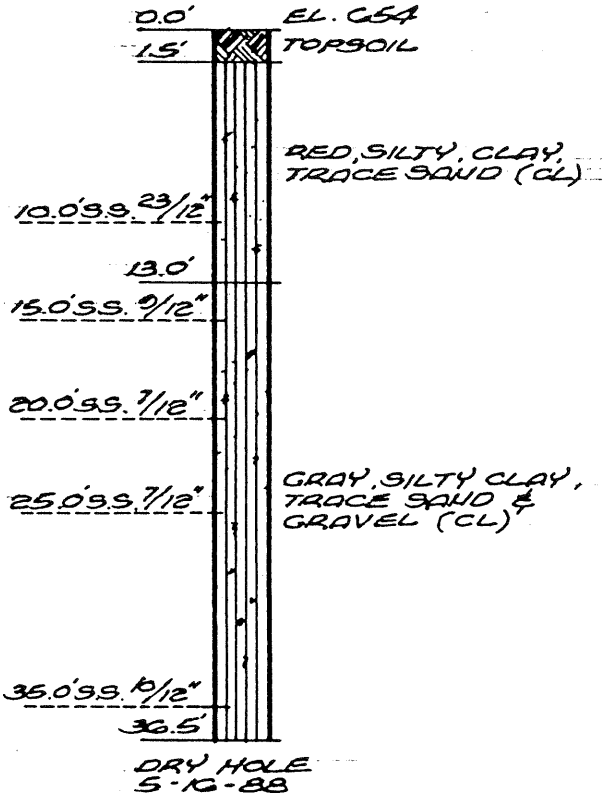
DRY HOLE

B-88-7 (N.54 - E.48)

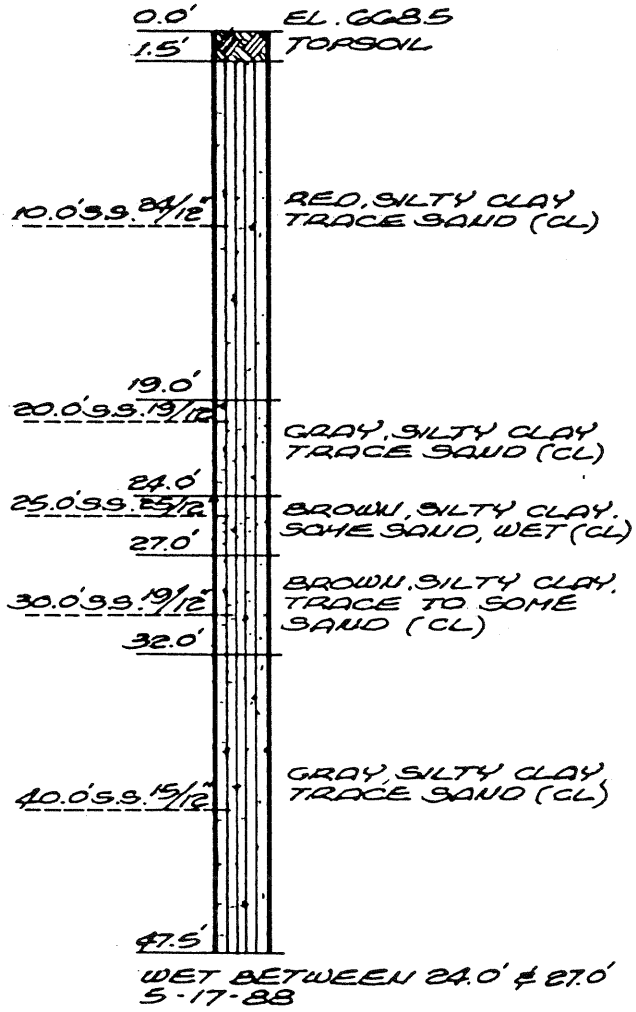


WET BETWEEN 2.5' & 4.5'

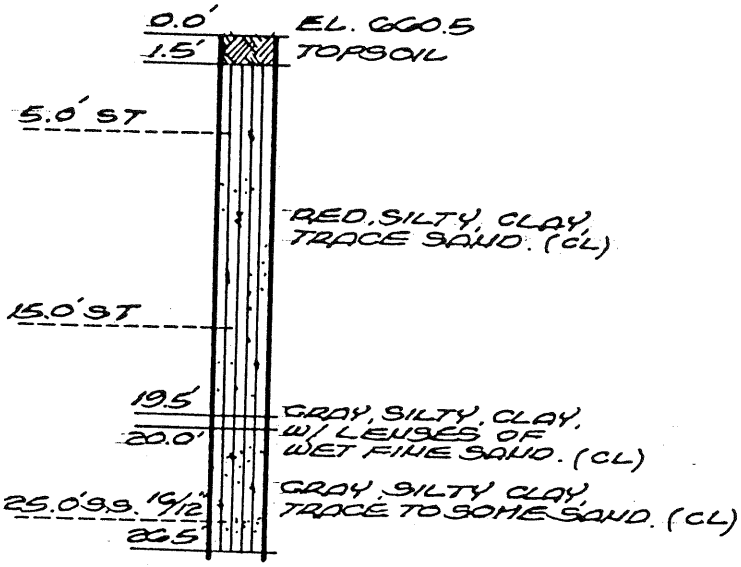
B-88-8 (N.51+20 - E.49)



B-88-9 (N.49 - E.36)



B-88-10 (N.45 - E.42)



SEEPAGE @ 19.5' TO 20'
OTHERWISE DRY HOLE.
5-17-88

TABLE NO. 1

SUMMARY OF LAB TESTS PERFORMED

Boring Number

SAMPLE DEPTH		88-1	88-2	88-3	88-4	88-5	88-6	88-7	88-8	88-9	88-10	*	**
5'	WN										X	X	X
	A										X	X	
	H										X	X	
	SG										X	X	X
	K										X	X	X
10'	WN	X	X	X	X	X	X		X	X			
	A	X			X				X				
	H		X			X	X						
	SG		X			X	X						
	K												
15'	WN	X	X	X	X	X	X	X	X		X		
	A		X	X		X	X		X		X		
	H				X			X	X		X		
	SG				X			X	X		X		
	K										X		
20'	WN	X	X	X		X	X	X	X	X			
	A					X	X	X	X				
	H	X	X	X		X	X		X	X			
	SG	X	X	X		X	X		X	X			
	K					X							
25'	WN	X	X	X		X	X	X	X	X	X		
	A	X	X	X					X	X			
	H	X		X		X	X	X		X	X		
	SG	X		X		X	X	X		X	X		
	K	X		X									
30'	WN	X	X	X	X	X	X	X		X			
	A	X					X	X		X			
	H				X					X			
	SG				X					X			
	K												
35'	WN	X											
	A												
	H	X											
	SG	X											
	K												

*Cell "D" Sidewall at N58,E23 @4' above cell bottom - Vertical Sample
** Cell "D" Sidewall at N58,E23 @ 3' above cell bottom - Horizontal Sample

WN - Natural Water Content
A - Atterburg Limits
H - Hydrometer
SG - Specific Gravity
K - Permeability

Appendix A

Boring Logs for Methane Probes

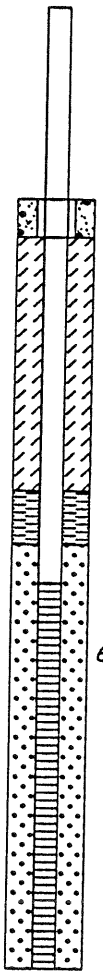
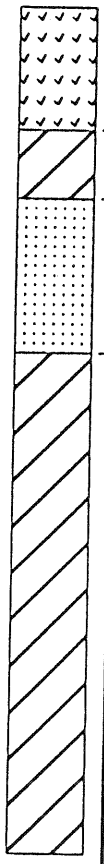
SOIL BORING LOG

BORING MM-1

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 7032.86 N. 1205.58 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/23/93

PROJECT NO.: 06181.1
G.S. ELEV.: 668.40'
TOC ELEV.: 671.29'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/23/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor		-2.5 / 670		Black sandy clay topsoil, roots, wet.	Split spoon SS-1: 0 - 2' Blows/6": 1,2,4,4	SS-1		6	
Bentonite slurry from 0.5 to 3.8'.		0 / 667.5		Mottled brown clay, some fine to medium sand, moist.					
Bentonite slurry from 0.0 to 3.8'.		2.5 / 665		Brown fine to medium sand, wet.	SS-2: 2 - 4' Blows/6": 3,3,3,4	SS-2		6	
Hydrated bentonite "Hole plug" from 3.8 to 4.5'. Gravel pack from 4.5 to 10'.		5 / 662.5		Brown/gray mottled clay, trace fine sand, stiff, moist.	SS-3: 4 - 6' Blows/6": 3,5,10,12	SS-3		15	
2" ID 10-slot screen from 5.0 to 10.0'		7.5 / 660		As above, mottled brown, occasional fine gravel.	SS-4: 6 - 8' Blows/6": 3,6,10,12	SS-4		16	
					SS-5: 8 - 10' Blows/6": 3,7,9,12	SS-5		16	
		10 / 657.5		Total depth = 10 feet.					
		12.5 / 655							
		15							

Explosive gas monitoring probe MM-1 installed in boring upon completion.

SOIL BORING LOG

BORING MM-2

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 7020.04 N. 2188.42 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/23/93

PROJECT NO.: 06181.1
G.S. ELEV.: 663.40'
TOC ELEV.: 665.95'
TOTAL DEPTH: 12'

LOGGED BY: M. Wolf
DATE END: 9/23/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		-2.5							
		665							
		0		Brown clay, some fine sand, roots, moist	Split spoon SS-1: 0 - 2' Blows/6": 2,2,3,3	SS-1		5	
		662.5		Mottled brown clay, trace fine sand, stiff, moist					
Bentonite slurry from 0.3 to 2.0'									
"Hole Plug" from 2.0 to 2.3'		2.5			SS-2: 2-4' Blows/6": 2,2,5,5	SS-2		7	
		660							
ravel pack om 2.3 to .0'. 2" ID 10-slot PVC screen from 5-7.5'					SS-3: 4 - 6' Blows/6": 2,3,4,5	SS-3		7	
		5		Black clay, some fine sand, trace silt, rootd, stiff, moist					
		657.5		Brown mottled clay, stiff with plastic seams, moist	SS-4: 6-8' Blows/6": 1,2,4,4	SS-4		6	
				Black sandy clay, plastic, moist					
		7.5		Brown fine to medium grained sand, some clay, wet	SS-5: 8-10' Blows/6": 1,2,2,4	SS-5		4	
		655		Black clay some fine sand, plastic, moist					
		10		Brown mottled clay, some fine sand, moist	SS-6: 10-12' Blows/6": 4,7,8,12	SS-6		15	
				Brown fine to medium grained sand, trace clay wet					
Split spoon only from 10.0 to 12.0'.		652.5		Brown mottled clay, stiff, moist					
				End of Boring = 12', augers run to 10', split spoon only from 10-12'.					
		12.5							
		650							
		15							

Explosive gas monitoring probe MM-2 installed in boring upon completion.

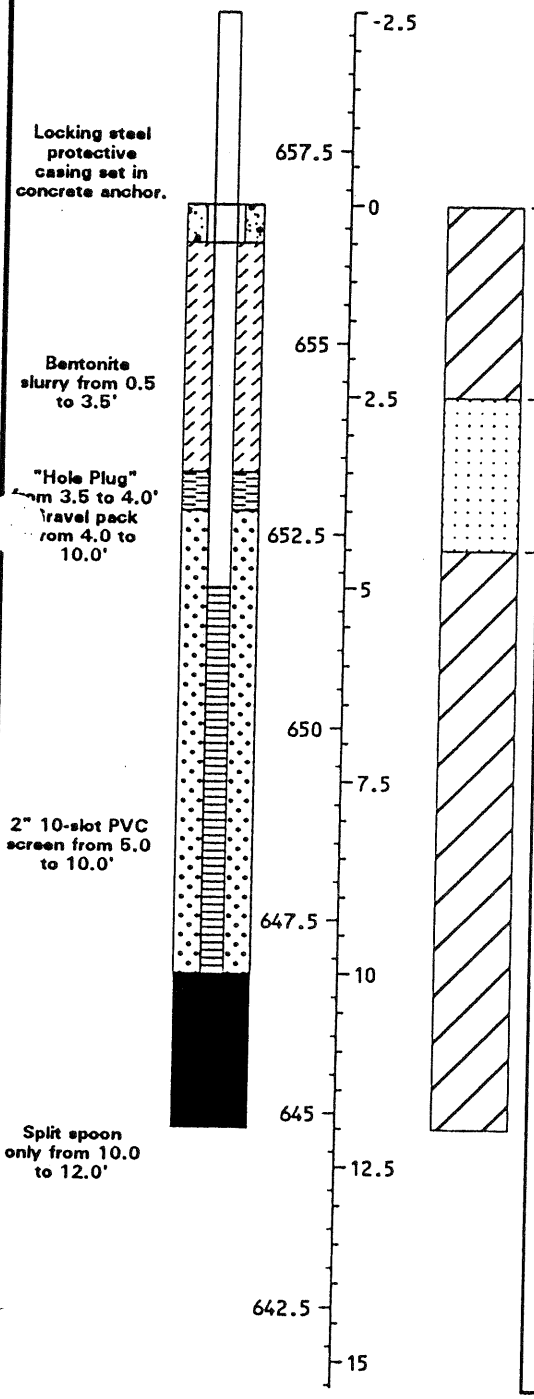
SOIL BORING LOG

BORING MM-3

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 7017.03 N. 3127.76 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/22/93

PROJECT NO.: 06181.1
G.S. ELEV.: 656.80'
TOC ELEV.: 659.36'
TOTAL DEPTH: 12'

LOGGED BY: M. Wolf
DATE END: 9/22/93



DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOVERY	"N" VALUE	PID (ppm)
Brown clay, some fine sand, stiff, moist	Split spoon SS-1: 0 - 2' Blows/6": 2,4,5,5	SS-1		9	
Black fine sand, some clay, moist	SS-2: 2 - 4' Blows/6": 2,3,4,6	SS-2		7	
Fine brown sand, moist	SS-3: 4 - 6' Blows/6": 2,3,5,8	SS-3		8	
Brown mottled clay, trace sand, moist	SS-4: 6 - 8' Blows/6": 4,8,13,15	SS-4		21	
Brown mottled clay, stiff, moist	SS-5: 8 - 10' Blows/6": 3,7,13,14	SS-5		20	
	SS-6: 10 - 12' Blows/6": 5,8,11,13	SS-6		19	
End of boring = 12', augers to 10', split spoon only from 10-12'.					

Explosive gas monitoring probe MM-3 installed in boring upon completion.

WW ENGINEERING AND SCIENCE

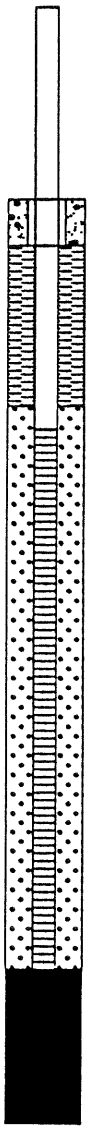
SOIL BORING LOG

BORING MM-4

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 7000.32 N. 4231.50 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/22/93

PROJECT NO.: 06181.1
G.S. ELEV.: 652.90'
TOC ELEV.: 655.07'
TOTAL DEPTH: 12'

LOGGED BY: M. Wolf
DATE END: 9/22/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		655 -2.5							
		652.5 0		Brown fine to medium grained sand, moist	Split spoon SS-1: 0 - 2' Blows/6": 3,4,6,7	SS-1		10	
				Black fine grained sand, trace silt, roots					
"Hole Plug" from 0.6 to 2.7'				Brown mottled clay, trace sand, moist	SS-2: 2-4' Blows/6": 3,5,6,3	SS-2		11	
Gravel pack from 2.7 to 8.0'		650 2.5		Brown fine to medium grained sand, moist					
' ID 10-slot ·en from 3.0 to 8.0'				Brown mottled clay, trace sand, stiff, moist	SS-3: 4-6' Blows/6": 1,1,3,4	SS-3		4	
		647.5 5		Brown fine to medium grained sand, moist					
				Brown mottled clay, trace sand, stiff, moist	SS-4: 6-8' Blows/6": 3,4,7,9	SS-4		11	
		645 7.5			SS-5: 8-10' Blows/6": 2,4,5,6	SS-5		9	
				Brown sand, trace clay, wet				14	
				Brown mottled clay, trace sand, moist					
		642.5 10		Red clay, trace sand and gravel, plastic, moist	SS-6: 10-12' Blows/6": 3,4,5,7	SS-6			
Split spoon only from 10.0 to 12.0'				Gray clay, trace sand, some gravel, wet					
		640 12.5		End of boring = 12', augers to 10', split spoon only to 12'.					
		15							

Explosive gas monitoring probe MM-4 installed in boring upon completion.

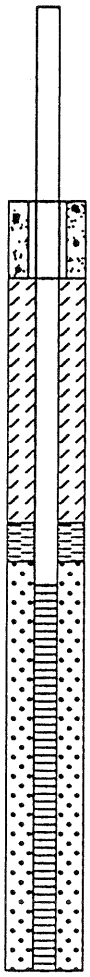
SOIL BORING LOG

BORING MM-5

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 6666.65 N. 4829.77 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/22/93

PROJECT NO.: 06181.1
G.S. ELEV.: 647.40'
TOC ELEV.: 649.79'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/22/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor		-2.5							
		647.5 / 0		Brown sandy clay, roots, plastic, moist	Split spoon SS-1: 0 - 2' Blows/6": 0,0,2,2	SS-1		2	
				Mottled brown clay, some fine sand, plastic, moist					
Bentonite slurry from 1.0 to 4.2'		645 / 2.5			SS-2: 2 - 4' Blows/6": 1,1,2,2	SS-2		3	
"Hole Plug" from 4.2 to 4.7' Gravel pack from 4.7 to 10'		642.5 / 5			SS-3: 4 - 6' Blows/6": 1,1,3,3	SS-3		4	
					SS-4: 6 - 8' Blows/6": 0,3,4,5	SS-4		7	
2" 10-slot PVC screen from 5.0 to 10.0'		640 / 7.5		Red clay, some fine sand, moist					
					SS-5: 8 - 10' Blows/6": 1,4,8,11	SS-5		12	
		637.5 / 10		Brown clay, trace of gravel, stiff, moist Total depth = 10 feet.	Total depth = 10'				
		635 / 12.5							
		632.5 / 15							

Explosive gas monitoring probe MM-5 installed in boring upon completion.

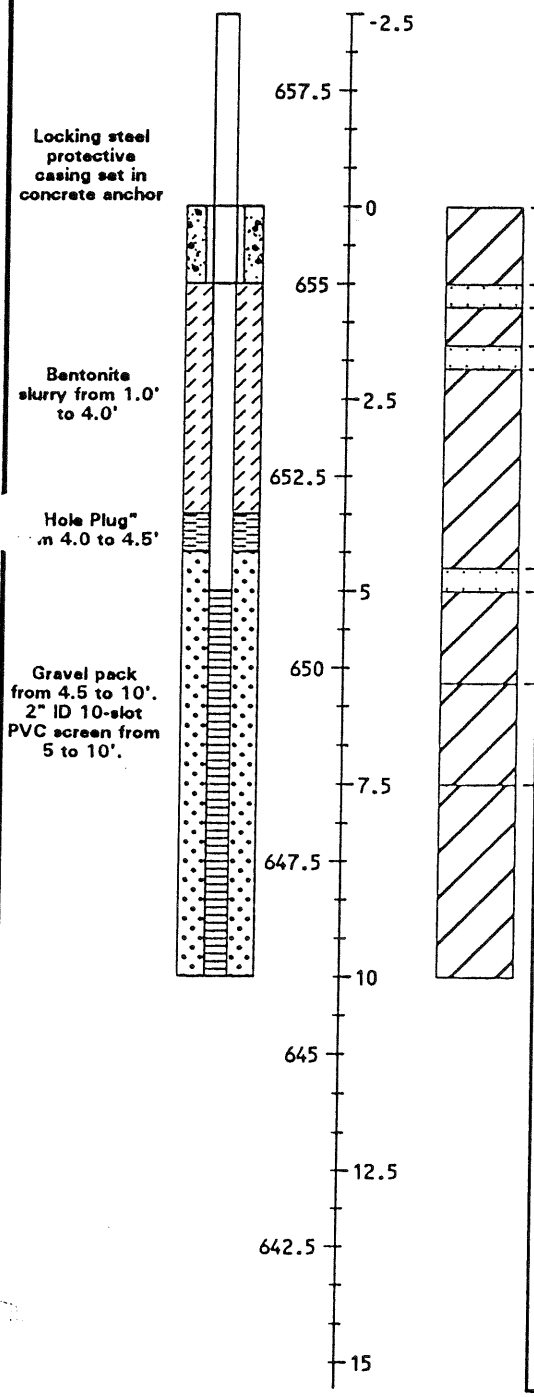
SOIL BORING LOG

BORING MM-6

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 5762.24 N. 4922.00 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/22/93

PROJECT NO.: 06181.1
G.S. ELEV.: 656.00'
TOC ELEV.: 658.50'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/22/93



DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Brown clay, some sand, moist.	Split spoon SS-1: 0 - 2' Blows/6": 0,2,3,4	SS-1		5	
Fine to medium grained brown sand, trace clay.					
Brown clay, mottled, moist.					
Fine to medium grained brown sand, trace clay.	SS-2: 2-4' Blows/6": 3,3,7,9	SS-2		10	
Brown clay, mottled, moist.					
Same, little gravel.	SS-3: 4-6' Blows/6": 3,4,5,6	SS-3		9	
Fine to medium grained brown sand, some gravel, moist.					
Brown clay, mottled, stiff, moist.					
Red clay, some fine sand and gravel, mottled, stiff, moist.	SS-4: 6-8' Blows/6": 2,5,7,11	SS-4		12	
Gray clay, trace fine sand, moist.					
Same, mottled, some gravel.	SS-5: 8-10' Blows/6": 3,4,7,7	SS-5		11	
	SS-6: 10-12' Blows/6": 3,5,9,10	SS-6		14	

Explosive gas monitoring probe MM-6 installed in boring upon completion.

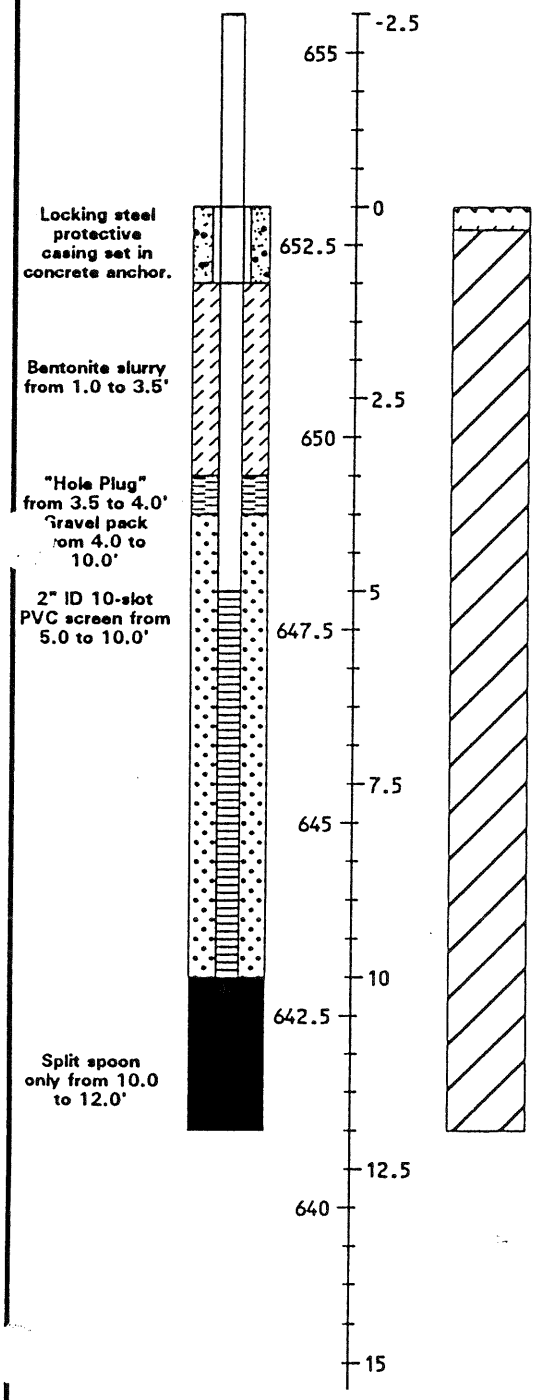
SOIL BORING LOG

BORING MM-7

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4933.92 N. 4944.14 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/22/93

PROJECT NO.: 06181.1
G.S. ELEV.: 653.00'
TOC ELEV.: 655.79'
TOTAL DEPTH: 12'

LOGGED BY: M. Wolf
DATE END: 9/22/93



WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
				Brown sandy clay, roots, moist	Split spoon SS-1: 0 - 2' Blows/6": 0,2,2,5	SS-1		2	
				Mottled brown clay, slightly moist					
					SS-2: 2 - 4' Blows/6": 2,5,7,9	SS-2		12	
				Brown clay, roots, moist					
				Brown mottled clay, stiff, slightly moist	SS-3: 4 - 6' Blows/6": 2,6,11,13	SS-3		17	
					SS-4: 6 - 8' Blows/6": 4,8,13,15	SS-4		21	
					SS-5: 8 - 10' Blows/6": 2,5,9,11	SS-5		14	
					SS-6: 10 - 12' Blows/6": 3,5,7,9	SS-6		12	
				End of boring = 12', auger to 10', split spoon only from 10-12'.					

Explosive gas monitoring probe MM-7 installed in boring upon completion.

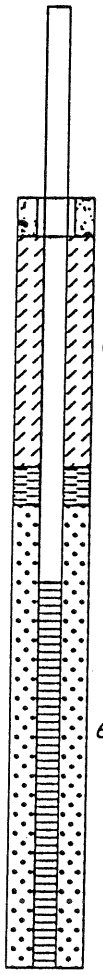
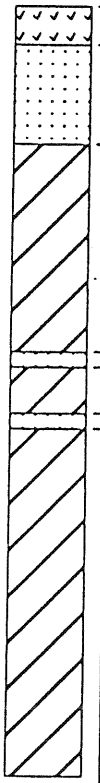
SOIL BORING LOG

BORING MM-8

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4453.72 N. 4514.77 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 659.40'
TOC ELEV.: 662.06'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID
Locking steel protective casing set in concrete anchor.		-2.5							
		660							
		-0		Topsoil, roots	Split spoon SS-1: 0 - 2' Blows/6": 1,1,2,2	SS-1		3	
				Brown fine to medium grained sand, wet					
		657.5							
Bentonite slurry from 0.5 to 3.5'		-2.5		Brown mottled clay, trace fine sand, moist	SS-2: 2 - 4' Blows/6": 1,4,6,8	SS-2		10	
"Hole Plug" from 3.5 to 4.0' Gravel pack from 4.0 to 10.0'					SS-3: 4 - 6' Blows/6": 3,6,8,10	SS-3		14	
		655							
		-5		Brown sand, wet					
				Brown mottled clay, trace sand, stiff, moist					
				Brown sand, wet					
				Brown mottled clay, trace sand, stiff, moist	SS-4: 6 - 8' Blows/6": 4,8,12,15	SS-4		20	
		652.5							
		-7.5							
2" 10-slot PVC screen from 5.0 to 10.0'					SS-5: 8 - 10' Blows/6": 3,7,12,14	SS-5		19	
		650							
		-10		Total Depth = 10'	SS-6: 10-12' Blows/6": 5,8,11,13	SS-6		19	
		647.5							
		-12.5							
		645							
		-15							

Explosive gas monitoring probe MM-8 installed in boring upon completion.

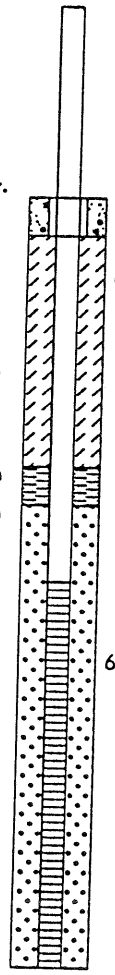
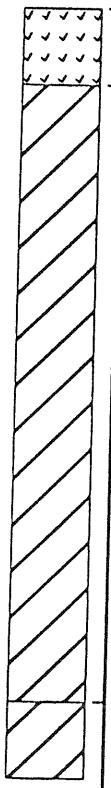
SOIL BORING LOG

BORING MM-9

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4457.34 N. 3636.72 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 663.50'
TOC ELEV.: 666.03'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		-2.5							
		665							
		0		Topsoil, fine to medium grained sand, roots, wet	Split spoon SS-1: 0 - 2' Blows/6": 3,3,4,7	SS-1		7	
		662.5		Brown mottled clay, trace sand and gravel, moist					
Bentonite slurry from 1.0 to 4.2'		2.5			SS-2: 2 - 4' Blows/6": 2,3,7,10	SS-2		10	
"Hole Plug" from 3.5 to 4.0'		660							
vel pack from 0 to 10.0'					SS-3: 4 - 6' Blows/6": 3,7,10,15	SS-3		17	
		5							
2" 10-slot PVC screen from 5.0 to 10.0'		657.5			SS-4: 6 - 8' Blows/6": 4,8,7,14	SS-4		15	
		7.5							
		655			SS-5: 8 - 10' Blows/6": 4,7,11,13	SS-5		18	
				Red clay, trace sand and gravel, stiff, moist					
		10		Total depth = 10 feet.	Total depth = 10'				
		652.5							
		12.5							
		650							
		15							

Explosive gas monitoring probe MM-9 installed in boring upon completion.

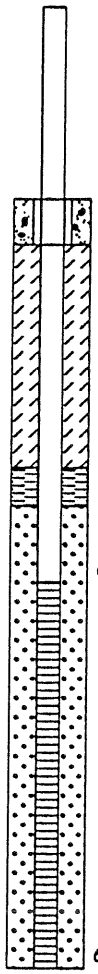
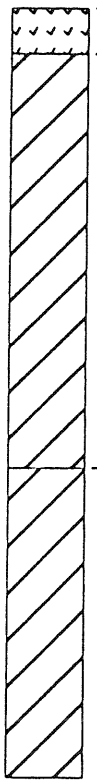
SOIL BORING LOG

BORING MM-10

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4448.61 N. 2621.10 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 672.30'
TOC ELEV.: 674.91'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor		-2.5							
		672.5 / 0		Black sandy clay topsoil, roots, moist.	Split spoon SS-1: 0 - 2' Blows/6": 0,2,3,3	SS-1		5	
				Mottled brown clay, trace fine to medium sand and gravel, mottled, moist.					
Bentonite slurry from 0.5 to 3.5'		670 / 2.5			SS-2: 2 - 4' Blows/6": 3,5,8,10	SS-2		13	
"Hole Plug" from 3.5 to 4.0'									
					SS-3: 4 - 6' Blows/6": 4,8,10,17	SS-3		18	
Gravel pack from 4.0 to 10'.		667.5 / 5							
				Red clay, trace sand and gravel, stiff, moist.	SS-4: 6 - 8' Blows/6": 4,11,12,16	SS-4		23	
		665 / 7.5							
2" ID 10-slot PVC screen from 5 to 10'.					SS-5: 8 - 10' Blows/6": 3,8,12,15	SS-5		20	
		662.5 / 10		Total depth = 10 feet.					
		660 / 12.5							
		657.5 / 15							

Explosive gas monitoring probe MM-10 installed in boring upon completion.

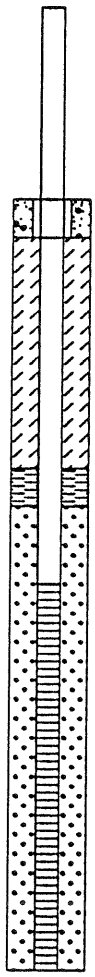
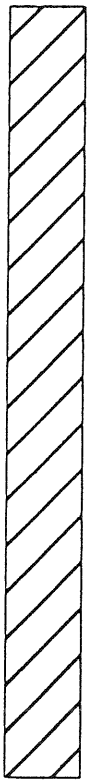
SOIL BORING LOG

BORING MM-11

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4458.48 N. 1896.70 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 675.30'
TOC ELEV.: 678.27'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		677.5 -2.5							
		675 0		Brown clay, some fine sand, moist Brown mottled clay, trace sand and gravel, moist	Split spoon SS-1: 0 - 2' Blows/6": 2,3,4,6	SS-1		7	
Bentonite slurry from 1.0 to 3.5'		672.5 2.5			SS-2: 2 - 4' Blows/6": 3,8,10,12	SS-2		18	
"Hole Plug" from 3.5 to 4.0' 'el pack from .0 to 10.0'		670 5			SS-3: 4 - 6' Blows/6": 5,10,16,19	SS-3		26	
2" 10-slot PVC screen from 5.0 to 10.0'		667.5 7.5			SS-4: 6 - 8' Blows/6": 5,16,18,23	SS-4		44	
					SS-5: 8 - 10' Blows/6": 4,9,12,17	SS-5		21	
		665 10		Total depth = 10 feet.	Total depth = 10'				
		662.5 12.5							
		660 15							

Explosive gas monitoring probe MM-10 installed in boring upon completion.

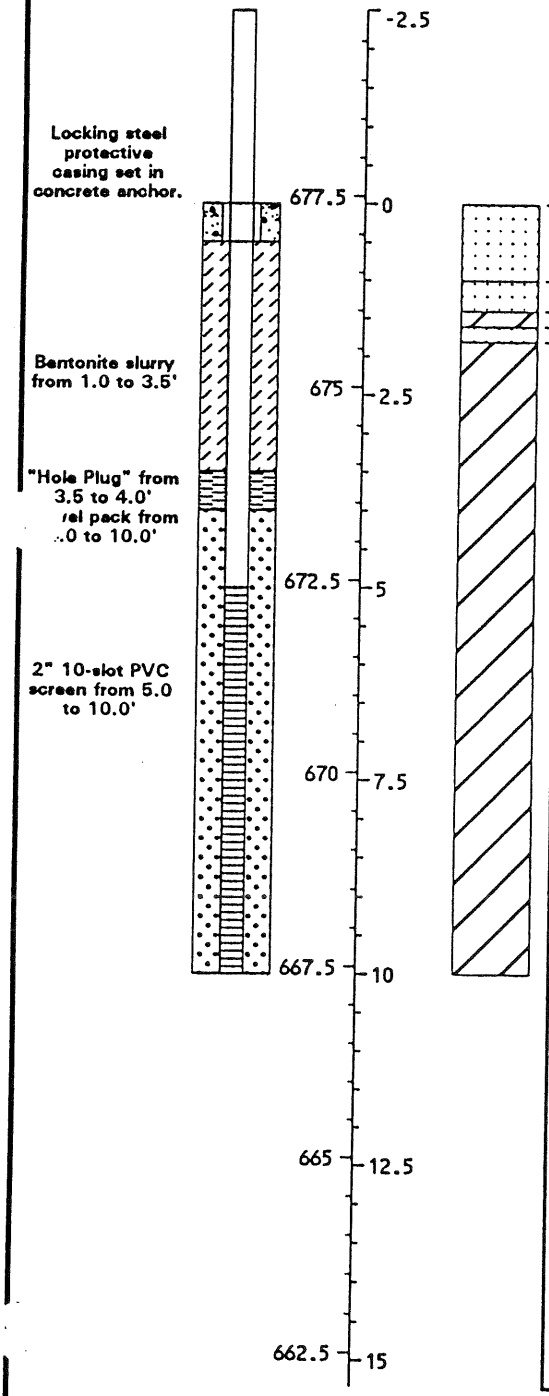
SOIL BORING LOG

BORING MM-12

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 4440.25 N. 1327.60 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 677.40'
TOC ELEV.: 680.50'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93



WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID
				Black fine to medium grained sand, roots, moist	Split spoon SS-1: 0 - 2' Blows/6": 3,2,4,4	SS-1		6	
				Brown sand, moist					
				Brown mottled clay, some sand, stiff, moist					
				Brown sand, wet	SS-2: 2 - 4' Blows/6": 2,4,8,12	SS-2		12	
				Brown mottled clay, trace sand and gravel, stiff, moist					
					SS-3: 4 - 6' Blows/6": 4,6,10,13	SS-3		16	
					SS-4: 6 - 8' Blows/6": 4,12,15,20	SS-4		27	
					SS-5: 8 - 10' Blows/6": 3,7,12,14	SS-5		19	
				Total depth = 10 feet.	Total depth = 10'				

Explosive gas monitoring probe MM-12 installed in boring upon completion.

WW ENGINEERING AND SCIENCE

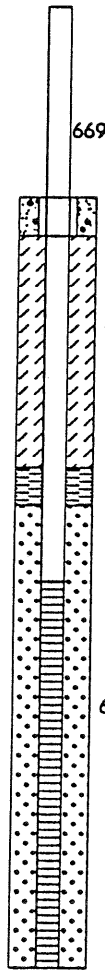
SOIL BORING LOG

BORING MM-14

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 5518.12 N. 1049.30 E.
DRILLING METHOD: 4.25" Hollow stem augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 669.10'
TOC ELEV.: 672.41'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		669.9999							
		667.5		Brown clay, some fine sand, stiff, moist	Split Spoon (SS-1): 0-2' Blows/6": 3,4,5,6	SS-1		9	
Bentonite slurry from 0.5 to 3.5'					SS-2: 2-4' Blows/6": 2,3,5,7	SS-2		8	
"Hole Plug" from 3.5 to 4.0' Gravel pack from 4.0 to 10.0'		665			SS-3: 4-6' Blows/6": 2,3,3,5	SS-3		6	
				Brown mottled clay, trace fine sand, moist					
		662.5			SS-4: 6-8' Blows/6": 2,4,6,7	SS-4		10	
2" 10-slot PVC screen from 5.0 to 10.0'					SS-5: 8-10' Blows/6": 2,6,10,12	SS-5		16	
		660							
		657.5							
		655							

Explosive gas monitoring probe MM-14 installed in boring upon completion.

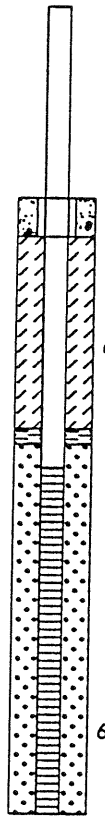
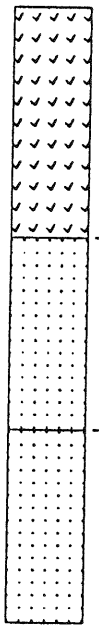
SOIL BORING LOG

BORING MM-16

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 6710.14 N. 1063.91 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/23/93

PROJECT NO.: 06181.1
G.S. ELEV.: 674.40'
TOC ELEV.: 676.73'
TOTAL DEPTH: 8'

LOGGED BY: M. Wolf
DATE END: 9/23/93

WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
Locking steel protective casing set in concrete anchor.		675 / 0		Topsoil, roots	Split spoon SS-1: 0 - 2' Blows/6": 2,2,2,3	SS-1		4	
Bentonite slurry from 0.5 to 3.0'		672.5 / 2.5			SS-2: 2 - 4' Blows/6": 2,1,1,1	SS-2		2	
"Hole Plug" from 3.0 to 3.2' Gravel pack from 3.2 to 8.5'				Fine brown sand, wet					
		670 / 5			SS-3: 4 - 6' Blows/6": 1,1,4,7	SS-3		5	
2" 10-slot PVC screen from 3.5 to 8.0'.				Brown fine to coarse grained sand, wet					
		667.5 / 7.5			SS-4: 6 - 8' Blows/6": 4,2,5,9	SS-4		7	
				Total depth = 8 feet.					
		665 / 10							
		662.5 / 12.5							
		660 / 15							

Explosive gas monitoring probe MM-16 installed in boring upon completion.

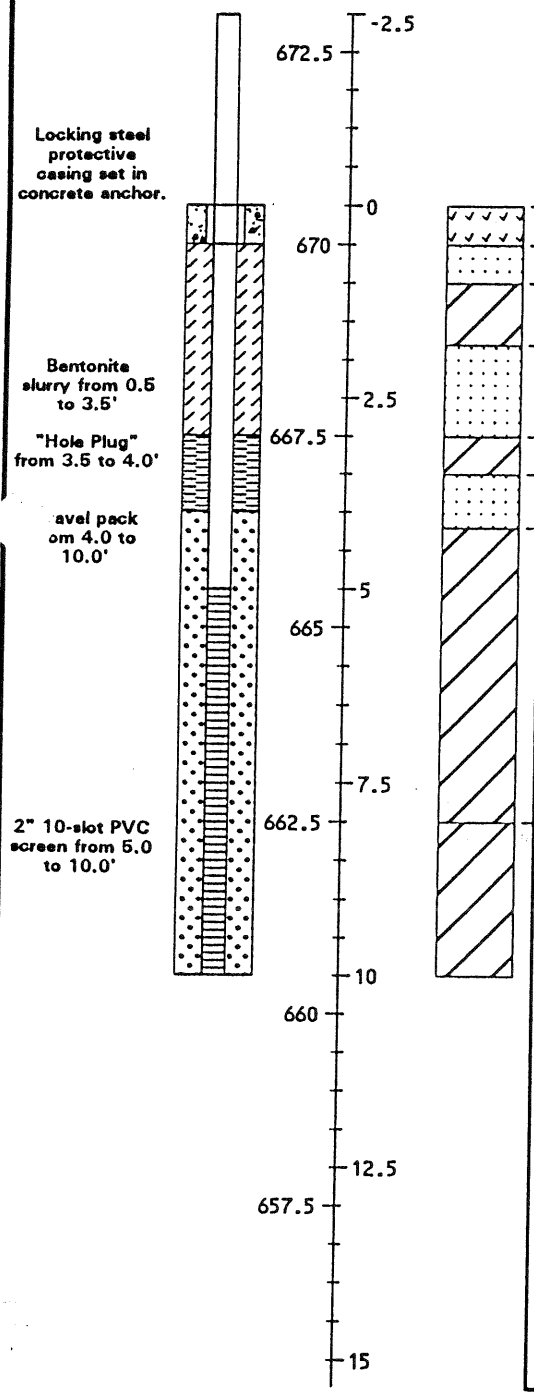
SOIL BORING LOG

BORING MM-15

PROJECT: Explosive Gas Monitoring Network
CLIENT/OWNER: Laidlaw, Inc., Ottawa County Farms
GRID COORDINATES: 6080.90 N. 1050.13 E.
DRILLING METHOD: 4.25" Hollow Stem Augers
CONTRACTOR: Stearns Drilling, Inc.
FINAL WATER LEVEL: T.O.C.:
DATES - DATE START: 9/24/93

PROJECT NO.: 06181.1
G.S. ELEV.: 670.50'
TOC ELEV.: 673.46'
TOTAL DEPTH: 10'

LOGGED BY: M. Wolf
DATE END: 9/24/93



WELL NOTES	WELL DETAIL	ELEVATION/ DEPTH	STRATA	DESCRIPTION	REMARKS	SAMPLE NUMBER	RECOV-ERY	"N" VALUE	PID (ppm)
				Topsoil, roots	Split spoon SS-1: 0 - 2' Blows/6": 3,2,5,5	SS-1		7	
				Black fine sand, some clay, moist					
				Black clay, some fine sand, moist					
				Brown sand, moist	SS-2: 2 - 4' Blows/6": 3,2,4,5	SS-2		6	
				Brown mottled clay, trace sand, moist					
				Brown sand, moist					
				Brown mottled clay, trace sand, moist	SS-3: 4 - 6' Blows/6": 2,3,8,12	SS-3		11	
					SS-4: 6 - 8' Blows/6": 3,7,12,14	SS-4		19	
				Red mottled clay, trace sand and gravel, moist	SS-5: 8 - 10' Blows/6": 4,10,17,18	SS-5		27	
				Total Depth = 10'	SS-6: 10-12' Blows/6": 6,7,18,19	SS-6		25	

Explosive gas monitoring probe MM-15 installed in boring upon completion.