The Geo-Institute

of the American Society of Civil Engineers

Presents

The Competition Rules for the 11th *Annual* National

GeoPREDICTION at

2020 Geo-Congress Minneapolis, MN

Important Dates

GeoPrediction Reports Due…….…….December 20, 2019 6:00PM PST

Invitation to GeoPrediction Finale…….....…. January 10, 2020

2020 Geo-Congress…….…….……February 25-28, 2020

Geo-Congress 2020 Information…….……https://www.geocongress.org/

GeoPrediction Presentations……..February 26, 2020

11th Annual National GeoPrediction Rules – 2020 Geo-Congress

1. Objective: The objective of the GeoPrediction competition is to develop an accurate prediction of geotechnical behavior given information regarding subsurface, boundary, and initial conditions, as well as the geotechnical/ structural/hydraulic loading. The GeoPrediction competition may involve using available geotechnical software, empirical correlations, or developing a simple but accurate computer code for making this prediction.

For the 2020 GeoPrediction, the competing teams will develop the estimated depth to the failure surface for an ongoing slope stability problem.

2. Geotech data: Input data for the problem including problem description, boring logs, and test data are found on the following sheets.

3. Eligibility: A GeoPrediction team will consist of one or two students. Each team MUST include at least one undergraduate student. Graduate students can not submit a prediction without mentoring an undergraduate student. However, a team may consist of one or two undergraduate students. Students must be enrolled during the Spring 2020 Semester or Quarter. Up to two teams per school may compete.

4. Submittal: Each GeoPrediction team will submit a GeoPrediction Report that will, at a minimum, contain the following information.

a. The Report shall be no more than three (3) pages long (not including any references and title page). One inch margins, single spacing, and 12 point Time New Roman font are required.
b. Include the provided Table 1 (completed) in your report.
c. Include the cross section provided with your estimated failure surface location.
d. The Report shall contain the methods (assumptions, correlations, analytical procedures, numerical procedures, computers software, etc.) that the team employed to develop the GeoPrediction. Methods must be referenced properly.
e. The cover page must include the name of the institution; names, email addresses, and status (i.e., graduate or undergraduate) of each team member; as well as the name and contact information of the faculty that advised the team in developing their prediction.
f. Submit your report electronically in PDF format to Dr. Matthew Sleep (matthew.sleep@oit.edu) by 6pm Pacific Standard Time on December 20 2019 with the subject line "2020 Geo-Congress GeoPrediction Submittal – *School Name*". Sender will receive confirmation of receipt by email. Late submissions are not accepted. If you do not

receive a confirmation email within 24 hours of submission, please re-send the information.

5. Judging: The submitted GeoPrediciton reports will be judged and ranked by an anonymous panel of geotechnical faculty and engineers. Initial judging will be based on criterial (a) through (d) below.

a.	Format, length, grammar, English usage	15%
b.	Clarity of technical presentation	15%
c.	Logical and concise use of appropriate geotechnical methods and principles	20%
d.	Accuracy of GeoPrediction	20%
e.	Presentation at the 2020 Geo-Congress	30%

6. Selection: The winning team will receive the prestigious Mohr's Circle Award. Up to fifteen (15) teams may be invited to the GeoPrediction Presentation based on the ranking of their GeoPrediction reports. The selected teams will be notified by January 10, 2019. The top teams (based total score of items a-d listed in section #5) will receive complementary student registration for up to two team members. After judging of presentations at Geo-Congress 2019, top ranked teams will also receive partial travel stipends.

7. Presentations: Teams invited to present their GeoPrediction Results will prepare a 10-minute (maximum) presentation that describes their methods and GeoPrediction for viewing by judges and the public. The order and location of the presentations will be determined at the conference site. It is expected that a room with a projector and computer will be used for these presentations.
As noted in Item 5, the Presentation will constitute the final 30% of each invited team's final GeoPrediction score.

8. Questions: Questions should be emailed to Matthew Sleep (matthew.sleep@oit.edu). It is anticipated that these questions will be uploaded for all to review at the GeoWorld Website (TBD)

Project Description

A landslide has occurred at a given location. Inclinometers have been installed to monitor the movement of the landslide. The landslide has had continuous movement for over a period of more than eight years. The landslide is occurring at a roadway (shown on the cross section). The roadway has had many repairs due to the amount of movement.

A cross section has been provided (B – B') as shown in Figure 2. The cross section has x,y coordinates shown with the y coordinate as elevation (ft).

Your estimate is to complete the cross section using appropriate stratigraphy from the provided boring logs. Note that you will have to do some interpretation to complete the cross section. Assign appropriate properties to the cross section and determine the location of the most likely failure surface. At points A, B, C and D on the cross section in Figure 2, determine the depth to your estimated failure surface and include those depths in Table 1 in your report.

Be mindful that 20% of your pre-conference score will be based on "Logical and concise use of appropriate geotechnical methods and principles." You should document your estimated soil properties in your report used for analysis.

Overview Map

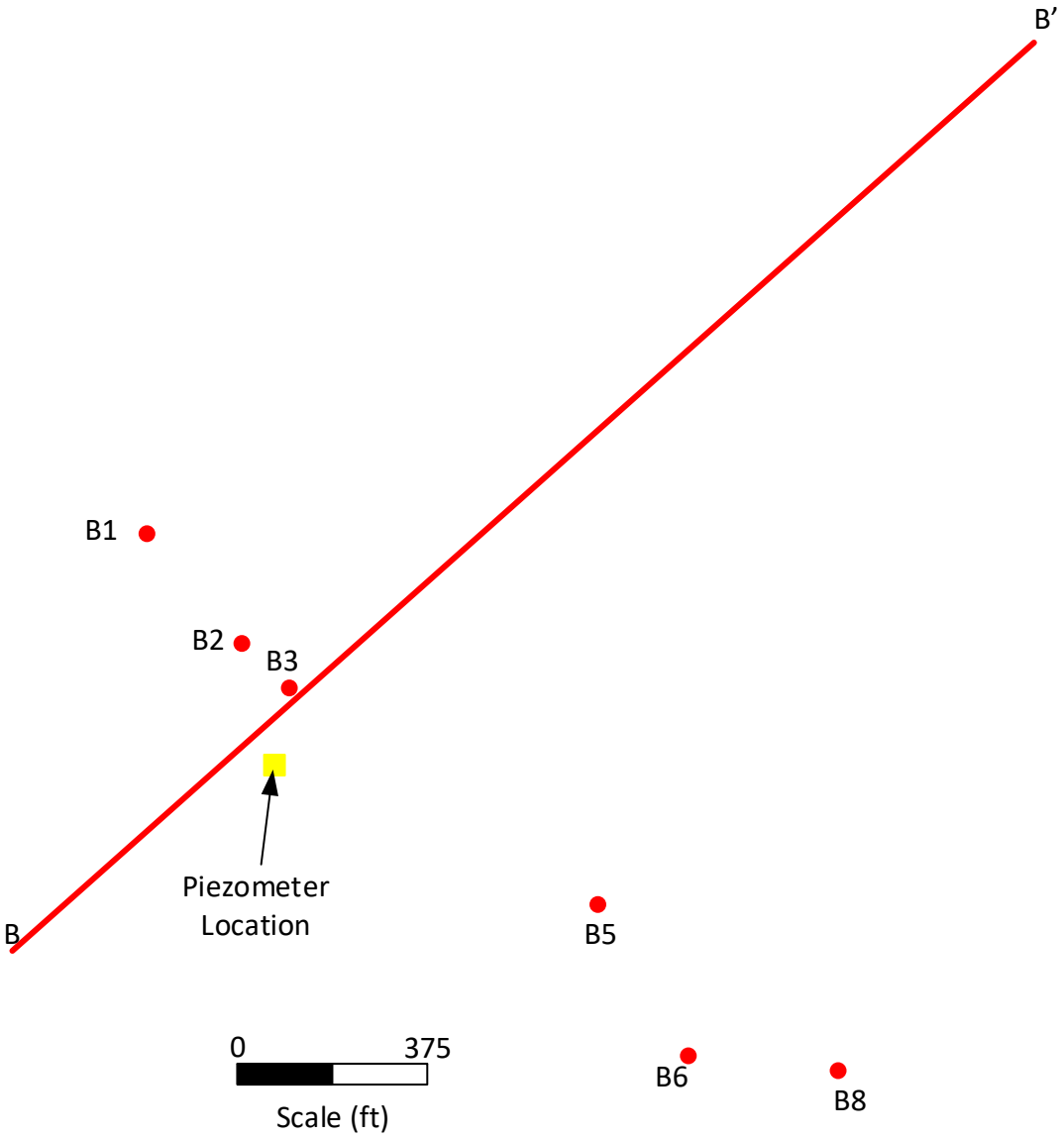


Figure 1 – Overview map showing locations of borings (B1, B2, B3, B5, B6 and B8), a piezometer installed during movement and the cross section B – B'

Cross Section (coordinates in feet)

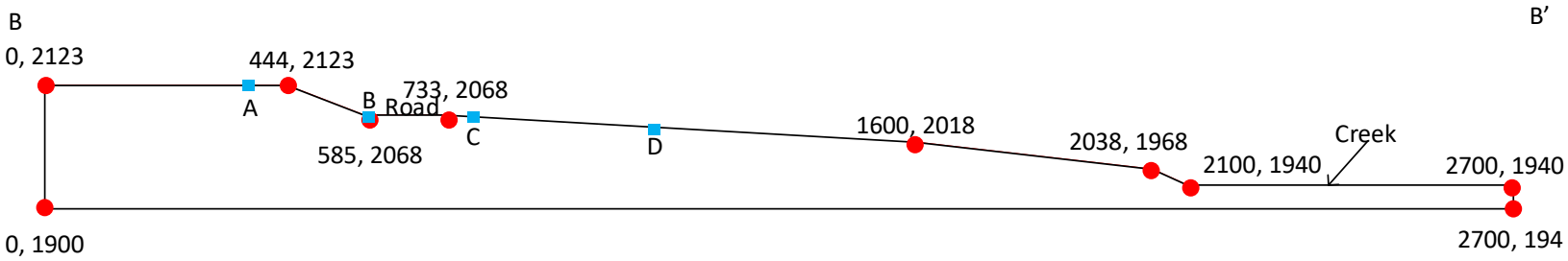


Figure 2 – Cross section B – B' Note – Red circles are coordinate points for the cross section (x, y) where y is the elevation. Blue squares A, B, C and D are the locations for reporting the depth to the estimated failure surface (Include this cross section in your report with the location of the estimated failure surface)

Table 1 – Table to be completed and included in your report (points A, B, C and D are shown on the cross section in Figure 2)

Point	Surface Elevation (ft)	Distance Along Section (ft)	Depth from Surface Elevation to Estimated Failure Surface (ft)
A	2123	400	
B	2068	585	
C	2063	750	
D	2046	1111	

*Report the depth from the surface elevation to the estimated slip surface to the nearest tenth (0.1) of a foot

Piezometer

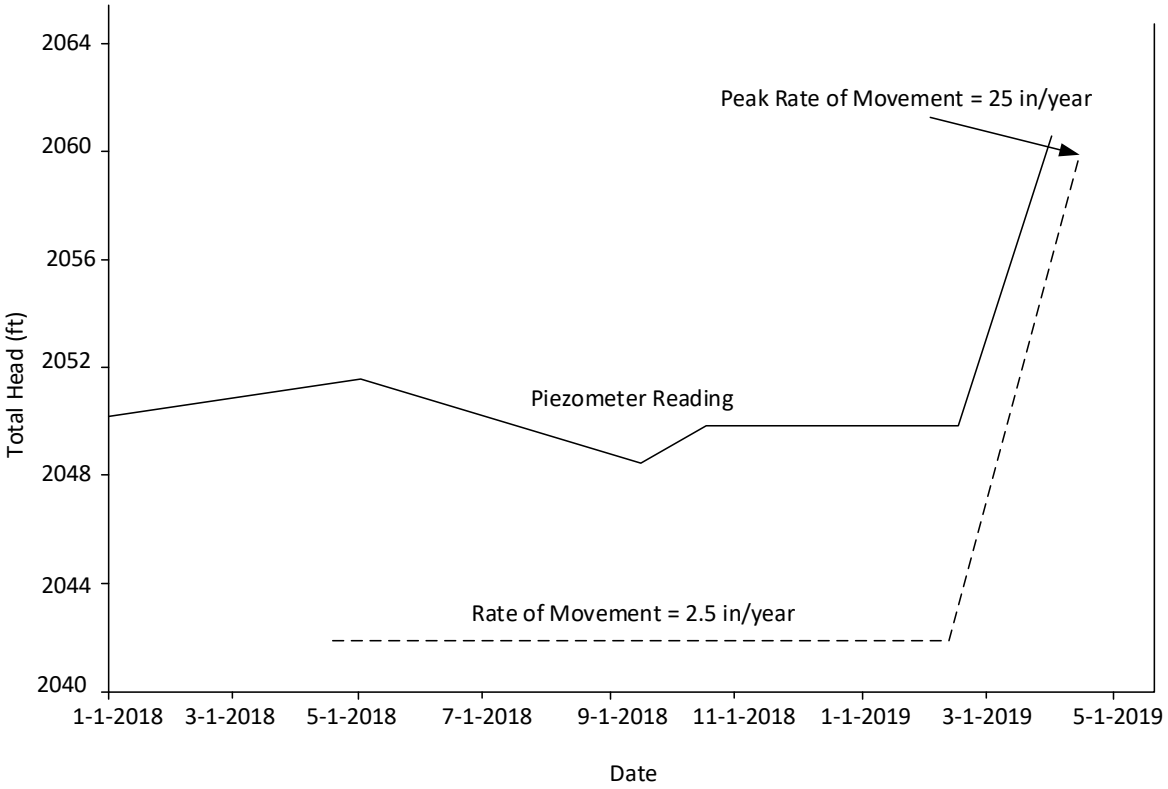


Figure 3 – Piezometer reading at the landslide site including the average rate of movement of installed inclinometers

LOG OF BORING B2

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2070.0 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / REC% / RQD % ◆ / SHEAR STRENGTH, tsf / NATURAL DRY DENSITY (pcf) ☆ / WATER CONTENT (%) × / PL / LL	INSTRUMENT INSTALLATION DETAILS
	0	Surface Elev.: 2070.0 ft							
		LEAN CLAY WITH SAND (CH): brown; moist; stiff to very stiff; trace lignite, some organics; (fill).			108	40	12	12; 17 40; 15.7	
		2067.5 ft	2.5ft						
		SANDY LEAN CLAY (CL): brown/tan to black; moist; stiff to hard; with some clayey sand, gravel, lignite and scoria; (fill).			109	30	18	18; 20 49; 25	
2065	5				110	80	34	34; 18 43; 19.2; 119 ☆	
					111	50	14	14; 18 39; 17.9	
		2060.0 ft							
2060	10	SILTY GRAVEL WITH SAND (GM): tan; moist; medium dense; with sand; (fill).	10.0ft		112	60	18	18; 10; 16 49; 26.1	
		2057.5 ft	12.5ft		113	60	10		
		LEAN CLAY WITH SAND (CL/CH): gray; moist; stiff; with lenses of silt; mottled; wet at top of sample.	15.0ft		114	100	17	17; 21 59; 30	
2055	15	2055.0 ft							
		FAT CLAY (CH): gray; moist; stiff to very stiff; with thin lenses of silt; mottled; trace gravel.	19.0ft		115	3	23	23; 22 99; 31	
2050	20	2051.0 ft			116	100	24	24; 25 131; 24.1	
		FAT CLAY (CH): bluish gray; moist; very stiff.	22.5ft						
		2047.5 ft			117	100	21	21; 22 124; 26.2	
		FAT CLAY (CH): bluish gray; moist; very stiff; with alternating layers of clayey/silty sand;	24.0ft 25.0ft		118	100	22	22; 27 92.2 174; 26.7	
2045	25	2046.0 ft	26.5ft						
					119	100	31	31; 20 110; 25.1	
		FAT CLAY (CH): gray; moist; very stiff.							
2040	30	2045.0 ft			120	100	28	28; 23 135; 23.5	
		FAT CLAY (CH): gray; moist; very stiff to hard; trace lignite	32.5ft						
		2043.5 ft			121	100	27	27	
		FAT CLAY (CH): bluish gray; moist; trace lignite; few silt partings.	35.0ft		122	100	27	27	
2035	35	2037.5 ft							
		SILTY TO CLAYEY SAND (SM-SC): bluish gray; moist; medium dense.	37.5ft		123	100	30	30; 19.4 <<; 108 ☆	
	40								

Continued Next Page

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling
— Dry

Weather: Overcast, 22 F

LOG OF BORING B2

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2070.0 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5); NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
	40	2035.0 ft SILTY SAND (SM): bluish gray; moist; medium dense.			124	100	27	27	
		2032.5 ft	42.5ft		125	100	50/6"	50/6" >>	
2025	45	LEAN CLAY WITH SAND (CL/CH): gray; moist; very stiff to very stiff; with 1" lense of fat clay. *(Continued)* 2027.5 ft	45.0ft		126	100	34	34	
		LIGNITE: black to brown; wet; wet at sampler tip. 2025.0 ft	47.5ft		127	100	29	29 22 85 104 ☆ 21.2	
2020	50	SILT (ML): gray; moist; very stiff to hard; with few lenses of fat clay and lignite. 2022.5 ft			128	80	30	30 22 102 23.6	
		FAT CLAY (CH): gray; moist; very stiff; with seams of silt and silty sand; 49':	52.5ft 54.0ft		129	100	30	30	
2015	55	2017.5 ft	55.0ft		130	90	31	31 23 78 22.3	
		SILT (ML): gray; moist; very stiff; with few seams of silty sand and fat clay. 2016.0 ft	57.5ft		131	100	32	32 25 91.0 100 30.6	
2010	60	FAT CLAY (CH): gray; moist; very stiff; with seams of silt and silty sand; trace lignite and siltstone. 2015.0 ft			132	100		25 113 39.3	
		FAT CLAY (CH): gray; moist; hard; trace siltstone. 2012.5 ft	62.5ft		133	78	61	61 27 102 43.7	
2005	65	FAT CLAY (CH): gray; moist to wet; hard; trace lignite; trace scoria. 59.5': lignite seams are wet;	66.5ft		134A	100	64	64 25 109 47.2	
					134B	100		20 93 28.6	
					135	100	43	43 23 93 19.6	
2000	70	2007.5 ft	70.0ft		136A	100	39	39 18 83 19.5	
		FAT CLAY (CH): gray to brown; moist to wet; hard; alternating layers of clay and lignite.	71.5ft		136B	100		19 74 17.4	
					137A	100	36	36 18 67 19.5	
1995	75	2003.5 ft			137B	100			
		FAT CLAY (CH): bluish gray; moist; hard; trace to few silt seams. 2000.0 ft	75.0ft 77.5ft		138	100	37	37 << 14.8 115 ☆	
					139A	100	38	38	
	80	SILT (ML): bluish gray;	79.0ft		139B	100		27 189 27.9	

Continued Next Page

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▼ At Time of Drilling
— Dry

Weather: Overcast, 22 F

LOG OF BORING B2

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2070.0 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / REC% / RQD % ◆ / SHEAR STRENGTH, tsf	NATURAL DRY DENSITY (pcf) ☆ / WATER CONTENT (%) × / PL / LL	INSTRUMENT INSTALLATION DETAILS
	80	moist; hard; with few lenses of silty sand. 1998.5 ft			140A	100	40	40	27 24.2	173
					140B	100				
			81.5ft							
		FAT CLAY (CH): bluish gray; moist; hard. 1995.0 ft	82.5ft		141A	100	37	37	20 21.1	114
			83.5ft		141B	100			23 20.5	129
1985	85	CLAYEY SAND (SC): bluish gray; moist; dense. 1992.5 ft			142	100	33	33	25 24.3	102 122
		SANDY LEAN CLAY (CL): bluish gray; moist; hard. 1991.0 ft			143	100	35	35	26 37.5	175
1980	90	FAT CLAY (CH): blue; moist; hard. *(Continued)* 1988.5 ft			144	100	43	43	21 21.4	110
		SILTY SAND (SM): fine grained; blue; moist; hard. 1987.5 ft	92.5ft		145	100	46	46	26.7	
1975	95	FAT CLAY (CH): bluish gray; moist; hard; trace silt. 1986.5 ft			146	100	51	51	20.6	106
		FAT CLAY (CH): gray; moist; hard. 89.5': 1/2" lignite seam. 90': few silt lenses. 1977.5 ft	97.5ft		147A	100	55	55	21 22.2	138
	100		98.0ft		147B	100				
			100.0ft							
		FAT CLAY (CH): light gray; moist; hard. 1972.5 ft								
		SANDY LEAN CLAY (CL/CH): light gray; moist; hard. 1972.0 ft								
		FAT CLAY (CH): gray; moist; hard. 1970.0 ft								
		Bottom of Boring at 100.0 feet								

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling
— Dry

LOG OF BORING B3

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2063.7 ft
Drilling Method: HSA/AR
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 150.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5)	NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
	0	Surface Elev.: 2063.7 ft								
		0-20': Blind Drill.								
2060	5									
2055	10									
2050	15									
2045		2043.7 ft								
	20	FAT CLAY WITH ORGANICS (CH): black; moist; medium stiff; trace sand; (possible buried topsoil). 2042.2 ft	20.0ft		1	60	7	7, 5	36.2	
2040			21.5ft		2	13	5		25.7	
	25	LEAN TO FAT CLAY (CL/CH): gray; moist; medium stiff; trace roots; mottled. 2040.7 ft	23.0ft		3	10	9	9	28.4	
2035		LEAN CLAY (CL): gray; moist to wet; very soft to stiff; heavily mottled. 2038.7 ft	25.0ft		4	0				
	30	SAND WITH SILT OR SILTY SAND (SP-SM): gray; wet; very loose to loose; classification based on drilling conditions, heave in auger, sand on drill rods and sampler. 27.5': not sampled due to sand heave in auger. 2031.7 ft	32.0ft		5	10	WH			
2030					6	20	20	20	57.6	
	35		34.0ft		7	50	19	19		
2025					8	40	62	62		
	40	FAT CLAY (CH): gray;								

Continued Next Page

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▼ At Time of Drilling 22.5
Sampler wet at 22.5-25 ft sample

LOG OF BORING B3

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2063.7 ft
Drilling Method: HSA/AR
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 150.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %
	40	moist; very stiff; increasing lignite content.	9	88	40
		2029.7 ft			
		LIGNITE: black; moist to wet. *(Continued)* 43.0ft	10	40	19
2020		2020.7 ft			
	45	FAT CLAY (CH): gray; moist; very stiff; trace scoria; lignite lenses.	11	100	21
		44':			
		45': 1/2" to 3" lenses of lignite. 47.5ft	12	100	20
2015		2016.2 ft			
	50	FAT CLAY (CH): gray to bluish gray; moist; very stiff; trace lignite.	13	100	
		2011.2 ft 52.5ft			
2010		FAT CLAY (CH): gray; moist; medium stiff to stiff.	14	80	5
	55		15	70	10
		2006.2 ft			
		SANDY FAT CLAY (CH): bluish gray; moist; very stiff. 57.5ft	16	80	18
2005	60				
2000	65		17	60	24
			18	60	28
		1996.2 ft			
		FAT CLAY (CH): dark gray to bluish gray; moist; very stiff; 67.5'. 67.5ft	19	40	19
1995	70	1991.2 ft	20	60	18
		FAT CLAY (CH): gray; moist; very stiff to hard; trace lignite. 72.5ft	21	60	20
1990	75	75': siltstone rock at tip.	22	0	50/2"
		1986.2 ft			
		FAT CLAY (CH): gray; moist; very stiff. 77.5ft	23	100	18
1985	80				

Continued Next Page

STANDARD PENETRATION TEST DATA N in blows/ft ◎
16 32 48 64
REC%
RQD % ◆
20 40 60 80
SHEAR STRENGTH, tsf
0 2.5 5

NATURAL DRY DENSITY (pcf) ☆
80 100 120
WATER CONTENT (%) ×
PL LL
60 100 140

INSTRUMENT INSTALLATION DETAILS

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 22.5
Sampler wet at 22.5-25 ft sample

LOG OF BORING B3

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2063.7 ft
Drilling Method: HSA/AR
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 150.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %
	80	FAT CLAY (CH): gray; moist; very stiff. *(Continued)* 80': 81.5': 6" lignite seam.	24	80	16
1980	85	84': no lignite; '; trace lignite at 85'.	25	80	23
		1976.2 ft	26	70	29
1975	90	FAT CLAY (CH): gray; moist; hard; with lenses of lignite. 87.5ft	27	100	42
			28	80	45
1970	95	1967.2 ft	29A	100	42
		FAT CLAY (CH): gray; moist; very stiff to hard. 96.5ft	29B	100	42
1965	100	100': trace lignite.	30	90	34
1960	105	1957.2 ft	31A	100	27
		FAT CLAY (CH): gray; moist; very stiff. 106.5ft	31B	100	27
1955		1953.7 ft			
	110	FAT CLAY (CH): gray; moist; hard. 110.0ft	32	60	48
1950		1952.2 ft 111.5ft FAT CLAY (CH): gray; moist; hard.			
	115	1946.2 ft	33	80	52
1945		117.5-150': Blind Drill. 117.5ft			
	120	*Continued Next Page*			

STANDARD PENETRATION TEST DATA N in blows/ft ◎
16 32 48 64
REC%
RQD % ◆
20 40 60 80
SHEAR STRENGTH, tsf
0 2.5 5

NATURAL DRY DENSITY (pcf) ☆
80 100 120
WATER CONTENT (%) ×
PL LL
60 100 140

INSTRUMENT INSTALLATION DETAILS

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 22.5
Sampler wet at 22.5-25 ft sample

LOG OF BORING B3

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2063.7 ft
Drilling Method: HSA/AR
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 150.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ 16 32 48 64; REC%; RQD % ◆ 20 40 60 80; SHEAR STRENGTH, tsf 0 2.5 5	NATURAL DRY DENSITY (pcf) ☆ 80 100 120; WATER CONTENT (%) × PL LL 60 100 140	INSTRUMENT INSTALLATION DETAILS
1940	120									
	125									
1935										
	130									
1930										
	135									
1925										
	140									
1920										
	145									
1915										
	150	Bottom of Boring at 150.0 feet								1913.7

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 22.5
Sampler wet at 22.5-25 ft sample

LOG OF BORING B5

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2031.4 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling & thin wall
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5); NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
	0	Surface Elev.: 2031.4 ft							
2030		FAT CLAY (CH): brown to gray; moist; stiff; with gravel and organics; (fill).			45	29	13	13; 19 55 22.3	
		2028.9 ft							
		2.5ft CLAYEY SAND (SC): brown; moist; loose; trace roots; (fill).			46	28	5	5; 15 38 23.2	
	5	5.0ft 2026.4 ft			47	100	2	2; 31 80 25.3	
2025		FAT CLAY (CH): black to brown; moist to wet; very soft; with lignite; probable fill.							
		7.5ft 2023.9 ft			48	100	9	9; 23 72 30.1	
	10	FAT CLAY (CH): gray; moist; stiff; with seams of lignite and alkali inclusions.			49	100	9	9; 19 65 33.8	
2020		11.0ft 2020.4 ft							
		FAT CLAY (CH): gray; moist; stiff.				100	Push	18 67 102 ☆ 24.2	
	15	15': with seams of silty sand.			50	100	13	13; 17 83 25.7	
2015					51	83	10	10; 17 79 24.1	
	20	20': with seams of lignite.			52	100	11	11; 24 93 25.9	
2010		2009.9 ft							
		21.5ft FAT CLAY (CH): bluish gray; moist; stiff.			53	100	13	13; 24 136 28.3	
	25	2005.4 ft			54	67	16	16; 22 121 27.7	
2005		26.0ft FAT CLAY (CH): bluish gray; moist; medium stiff to stiff.			55	67	8	8; 18 62 25.3	
		2001.4 ft							
	30	30.0ft FAT CLAY (CH): gray; moist; soft; few lignite seams; contains very soft lenses.			56	67	4	4; 23 106 33.4	
2000		32.5ft				67	Push	20 81 104 ☆ 21.5	
	35	35.0ft FAT CLAY (CH): gray; moist.			57	80	15	15; 21 71 26.3	
1995		1996.4 ft							
		37.5ft FAT CLAY (CH): gray; moist; stiff; trace lignite seams.			58	100	23	23; 18 96 19.4	
	40	1993.9 ft							

Continued Next Page

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▼ At Time of Drilling
— Dry

Weather:

LOG OF BORING B5

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2031.4 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling & thin wall
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / REC% / RQD % ◆ / SHEAR STRENGTH, tsf	NATURAL DRY DENSITY (pcf) ☆ / WATER CONTENT (%) × / PL / LL	INSTRUMENT INSTALLATION DETAILS
1990	40	FAT CLAY (CH): bluish gray; moist; very stiff; 37.5':			59A	83	26	26	22 121 25.8	
	41.0ft				59B	56				
	43.0ft	LIGNITE: black to brown; moist. 1988.4 ft			60	80	20	20	29 107 27.6	
1985	45	FAT CLAY (CH): gray to black; moist; very stiff; alternating layers of fat clay and lignite; free water in lignite seams. 1985.9 ft			61	100	18	18		
	47.5ft				62	100	21	21	22 89 25.9	
1980	50	SILT (ML): gray; moist; very stiff; with lenses of fat clay. 1983.9 ft			63	100	18	18	22 85 99.2 ☆ 23.8	
	52.5ft				64	100	20	20	20 86 23.9	
1975	55	FAT CLAY (CH): gray; moist; very stiff; with lenses of silt. 50':			65	100	28	28	19 99 21.5	
					66	100	67/ 9"		67/9" >>	
	58.8ft	FAT CLAY (CH): gray; moist; very stiff; trace lignite seams. 1972.6 ft			67	0	50/ 2"		50/2" >>	
1970	60	FAT CLAY (CH): gray; moist; hard. 1971.4 ft								
	62.0ft	ROCK: unknown type. 1969.4 ft			68	100	40	40		
	64.5ft	CLAYEY TO SILTY SAND (SC-SM): gray; moist; dense. 1966.9 ft			69	100	40	40		
1965	65									
	67.5ft	FAT CLAY (CH): gray; moist; stiff; with lenses of clayey/ silty sand. 1965.9 ft			70	100	32	32		
	70.0ft	FAT CLAY (CH): gray; moist; hard; trace lignite; with lenses of silt. 1963.9 ft			71	100	34	34		
1960	70				72	100	43	43		
	74.0ft	LEAN CLAY (CL/CH): gray; moist; stiff. 1961.4 ft								
	75	FAT CLAY (CH): gray; moist; hard; trace lignite sediment; with lenses of silty sand. 1957.4 ft			73	100	36	36	20 111 22.9	
1955					74	100	38	38	21 125 23.1	
	80									

Continued Next Page

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▼ At Time of Drilling
— Dry

Weather:

LOG OF BORING B5

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2031.4 ft
Drilling Method: HSA
Sampling Method: Continuous split-spoon sampling & thin wall
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / REC% / RQD % ◆ / SHEAR STRENGTH, tsf	NATURAL DRY DENSITY (pcf) ☆ / WATER CONTENT (%) × / PL / LL	INSTRUMENT INSTALLATION DETAILS
1950	80	FAT CLAY (CH): gray; moist; hard; trace lignite; trace silty sand. *(Continued)*			75	100	29	29	19 / 22.1 / 112	
		1948.9 ft 82.5ft								
		FAT CLAY (CH): gray; moist; hard; with lenses of silty sand.			76	100	42	42		
1945	85	1946.4 ft 85.0ft			77	100	40	40	23.1 / 103 ☆	
		FAT CLAY WITH SILT LENSES (CH): gray; moist; hard.								
1940	90				78	100	41	41		
		1936.4 ft								
1935	95	LIGNITE: black; moist. 95.0ft			79	100	50/2"	50/2" >>		
		1931.4 ft								1931.4
	100	Bottom of Boring at 100.0 feet 100.0ft								

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling
— Dry

Weather:

LOG OF BORING B6

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2015.6 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5)	NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
	0	Surface Elev.: 2015.6 ft								
2015	0	0-20': Blind Drill.								
2010	5									
2005	10									
2000	15									
	20	1995.6 ft								
1995	20	LEAN CLAY (CL): dark brown; moist; medium stiff; with coarse sand throughout; with pockets of lignite. 1993.1 ft	20.0ft		148	80	8	8, 4		
	25	FAT CLAY (CH): dark brown to orangey brown; moist; soft; with wet lignite pockets; with multiple sand pockets. 1990.6 ft	22.5ft		149	90	4		29	
1990			25.0ft		150	80	7	7	25.5	
			26.0ft						100/6" >>	
		FAT CLAY (CH): gray; moist; medium stiff; few laminations of sand; mottled. 1989.6 ft	27.5ft		151	100	100/6"			
1985	30	FAT CLAY (CH): gray; moist; medium stiff; trace lignite pockets; mottled. 1988.1 ft	30.0ft		152	100	9	9	19 24.6	90.8 102
					153A	100	12	12	26 36.2	137
		SILTSTONE: tan/white; dry; very dense; chips that broke easily; 27.5': cobble/boulder. 1985.6 ft	34.5ft		153B	100	12	12		
1980	35		35.0ft		154	60	27	27		
			36.0ft							
		FAT CLAY (CH): bluish gray; moist; stiff; trace lignite; few silt laminations.	36.5ft		155	100	16	16	20 26.9	99
	40	*Continued Next Page*								

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling 37.5

LOG OF BORING B6

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2015.6 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5)	NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
1975	40	1981.1 ft LIGNITE: black; wet; trace fat clay. 1980.6 ft			157	100	26	26 ◎	23.5 × 103 ☆	
					158	100	19	19 ◎	22 × 95	
1970	45	FAT CLAY (CH): dark brown; moist; very stiff; with lignite. 1979.6 ft	44.5ft						22.4 ×	
		LIGNITE: black; moist; trace fat clay. 1979.1 ft			159	100	22	22 ◎	24 × 99.9 152	
		39.5': blocky structure.	49.5ft						25.3	
1965	50	FAT CLAY (CH): gray; wet to saturated; very stiff. *(Continued)*			160	100	17	17 ◎	28.9 ×	
		40': trace silt lenses.			161	100	16	16 ◎	25 131	
		42.5': 1" fine grained sand seam, with pockets of silty sand.	52.5ft						27.9	
1960	55	1971.1 ft 44.25': 2" lignite seam.	54.8ft		162	100	48	48 ◎	21.3 ×	
		FAT CLAY (CH): bluish gray; moist; very stiff; possible previously desiccated.			163	99	34	34 ◎	22 126	
		47': trace sand;							23.7	
1955	60	1966.1 ft			164	100	27	27 ◎	21 127	
		FAT CLAY (CH): dark gray; moist; very stiff; trace lignite. 1963.1 ft							22.9	
		CLAYEY SAND (SC): fine grained; gray; moist to wet; very dense. 1960.8 ft			165	100	36	36 ◎	23 × 105 ☆	
1950	65	FAT CLAY (CH): gray; moist; hard; brittle in some spots. 60': trace lignite sediment; with silt lenses.			166	100	32	32 ◎	23 128	
		65': trace silt throughout; lignite sediment striations throughout.							24.1	
		68.25': 2" sandstone.			167	100	42	42 ◎	23.2 ×	
		72.5': trace silt; trace lignite sediment.			168	100	50/5"	>> ◎	50/5"	
1945	70				169	100	32	32 ◎	20 120	
									25.5	
					170	100	37	37 ◎	26.2 ×	
1940	75	76.5': 1" of tan, broken, angular rock. 1938.1 ft	77.5ft		171	100	55	55 ◎	85/8"	
		LIGNITE: black; wet; platy.			172	69	85/8"	>> ◎		
	80	*Continued Next Page*								

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling 37.5

LOG OF BORING B6

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2015.6 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 100.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ 16 32 48 64 REC% RQD % ◆ 20 40 60 80 SHEAR STRENGTH, tsf 0 2.5 5	NATURAL DRY DENSITY (pcf) ☆ 80 100 120 WATER CONTENT (%) × PL LL 60 100 140	INSTRUMENT INSTALLATION DETAILS
1935	80	1935.6 ft 80.0ft 80-100': Blind Drill.								
1930	85	85': lignite seam ends based on drilling effort.								
1925	90									
1920	95									
	100	1915.6 ft Bottom of Boring at 100.0 100.0ft feet								1915.6

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 37.5

LOG OF BORING B8

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2004.3 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 105.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5)	NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
		Surface Elev.: 2004.3 ft								
2000	0	0-15': Blind Drill.								
	5									
1995	10									
1990	15	1989.3 ft FAT CLAY (CH): gray; moist; stiff; mottled; with a few lenses of SM-SC. 15.0ft 1986.3 ft			34	60	11	11	20 66 26.2	
1985	20	SANDY LEAN CLAY (CL): gray; moist; stiff; mottled; with a 1" scoria lense. 18.0ft 1984.3 ft			35	80	10	10	24.6	
		FAT CLAY WITH LIGNITE (CH): gray; moist; stiff; mottled. 20.0ft 1982.3 ft			36	80	10	10	30.5	
1980	25	FAT CLAY (CH): gray; moist; stiff; mottled. 22.0ft 1978.3 ft			37	100	10	10	20 74 27.7	
		FAT CLAY (CH): gray; moist; stiff to very stiff. 26.0ft			38	100	15	15	25 60 26.3	
1975	30	27': p 29': mottled for top 6"; transitioning to lignite. 30.5': 3" scoria lense. 1972.3 ft			39A	100	21	21	19 94 23.2	
					39B	100	21	21	20 74 26.9	
					40	100	15	15	23 93 24.6	
		32.0ft								
1970	35	FAT CLAY WITH LIGNITE (CH): dark gray to black; moist; very stiff.			41	100	28	28	28 109 26.7	
		34.5': possible slickenside 35.5ft			42	100	23	23	19 77 21.8	
1965	40	FAT CLAY (CH): bluish gray to dark bluish gray; moist; very stiff.			43	100	19	19	24.8	
		Continued Next Page								

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling
Dry

Weather:

LOG OF BORING B8

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2004.3 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 105.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft / REC% / RQD % / SHEAR STRENGTH, tsf	NATURAL DRY DENSITY (pcf) / WATER CONTENT (%) / PL / LL
1960	40	FAT CLAY (CH): bluish gray to dark bluish gray; moist; very stiff. Possible slickenside at 44': trace lignite.	44	100	24	24	23.4
		1959.3 ft	45	100	25	25	20 / 115 / 22.7
	45	45.0ft	46	100	26	26	22.5
1955		FAT CLAY (CH): dark gray; moist; very stiff.	47	100	29	29	21 / 111 / 23.1
	50		48	100	25	25	22.7
1950		53': trace lignite.	49	100	31	31	21 / 97 / 23.3
	55	1949.3 ft FAT CLAY (CH): gray; moist; very stiff; with lenses of lignite. 55.0ft	50	67	30	30	53
1945		1945.3 ft	51	100	53		
	60	LIGNITE: brown to black; moist. 59.0ft	52	79	76/ 11"		76/11" >>
1940		1939.3 ft	53	67	67	67	
	65	FAT CLAY (CH): gray; moist; hard. 65.0ft	54A	100	35	35	20 / 164
		1938.8 ft 65.5ft	54B	100	35	35	18 / 113 / 22.5
1935		CLAYEY SAND (SC): bluish gray; moist; dense to very dense; with lenses of lignite.	55	100	50	50	21.7
	70	1934.3 ft 70.0ft	56	40	50/ 5"		50/5" >>
		FAT CLAY (CH): gray; moist; hard; hit rock with sampler.	57	72	50/ 5"		50/5" >>
1930		1931.3 ft 73.0ft					
	75	LIGNITE: dark brown to black; moist.	58	33	50/ 3"		50/3" >>
1925	80						

Continued Next Page

INSTRUMENT INSTALLATION DETAILS

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling
Dry

Weather:

LOG OF BORING B8

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2004.3 ft
Drilling Method: HSA
Sampling Method: Blind Drill, Continuous split spoon sampling
Completion Depth: 105.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %
	80	LIGNITE: dark brown to black; moist. *(Continued)*					
1920		1919.3 ft					
	85	FAT CLAY (CH): light gray; moist; hard. 85.0ft			59	100	39
1915	90						
1910		1909.3 ft					
	95	FAT CLAY (CH): light gray; moist; hard. 95.0ft			60	100	70
1905		1904.3 ft					
	100	100-105': Blind drill to set SAA casing. 100.0ft					
1900		1899.3 ft					
	105	Bottom of Boring at 105.0 feet 105.0ft					

STANDARD PENETRATION TEST DATA N in blows/ft ◎
16 32 48 64
REC% ▭
RQD % ◆
20 40 60 80
SHEAR STRENGTH, tsf
0 2.5 5

NATURAL DRY DENSITY (pcf) ☆
80 100 120
WATER CONTENT (%) ×
PL LL
60 100 140

39 ◎
20 64
19.2
70 ◎ 19 105
16.9

INSTRUMENT INSTALLATION DETAILS
1899.3

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

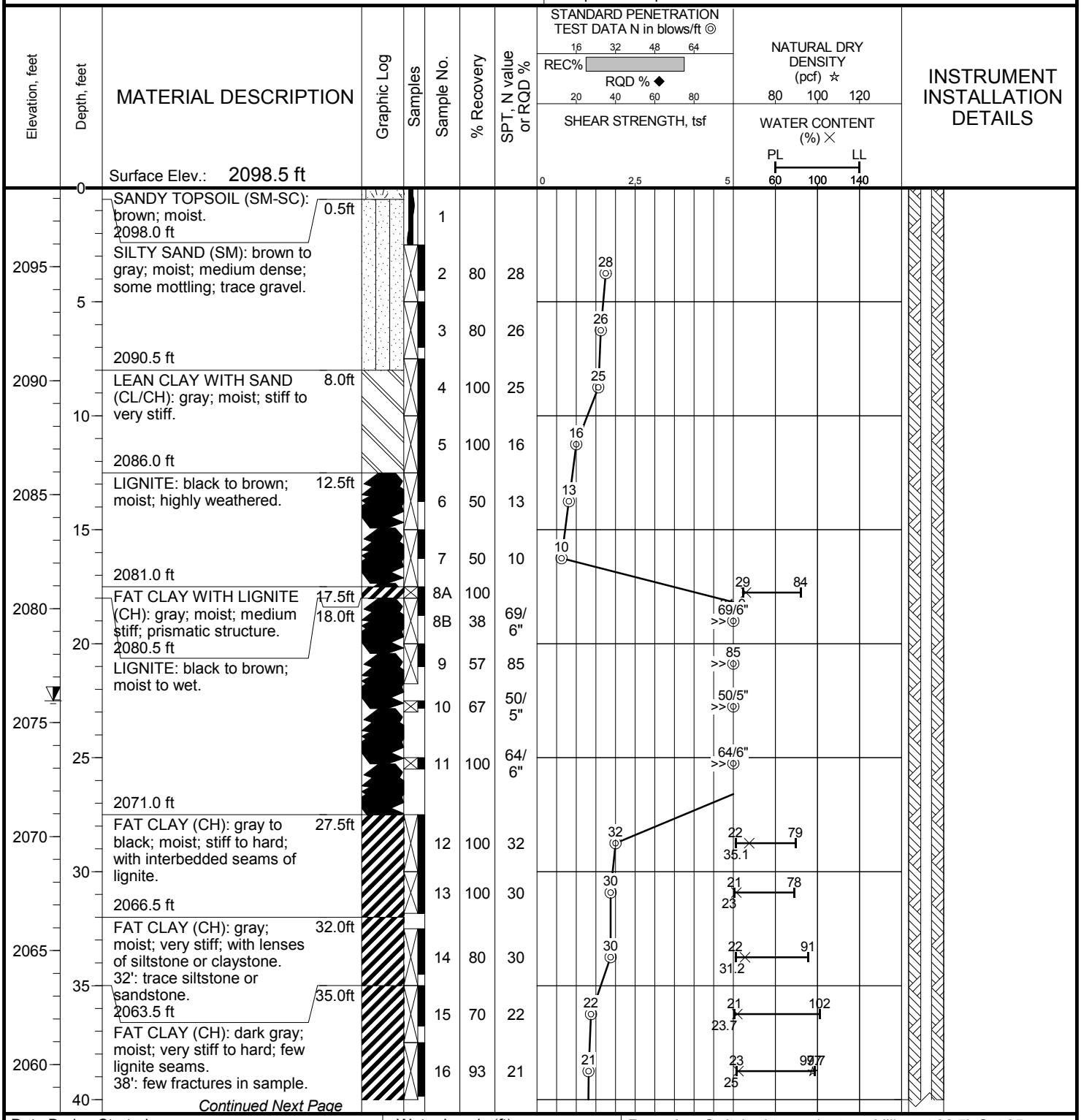
Water Levels (ft)
▽ At Time of Drilling
▽ Dry

Weather:

Boring B1

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2098.5 ft
Drilling Method: HSA/MR
Sampling Method: Continuous split-spoon sampling
Completion Depth: 120.0 ft



Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 22.5

Remarks: Switched to mud rotary drilling at 32.5'. Set 85 mm inclinometer casing at completion of borehole.

Weather:

Boring B1

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2098.5 ft
Drilling Method: HSA/MR
Sampling Method: Continuous split-spoon sampling
Completion Depth: 120.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ / REC% / RQD % ◆ / SHEAR STRENGTH, tsf	NATURAL DRY DENSITY (pcf) ☆ / WATER CONTENT (%) × (PL, LL)	INSTRUMENT INSTALLATION DETAILS
2055	40	FAT CLAY (CH): dark gray; moist; very stiff to hard; few lignite seams. *(Continued)*	17	73	21	21, 32	20 / 80 / 25.8	
		43': layer of light gray fat clay.	18	83	32		21 / 103 / 27.2	
	45	2053.5 ft						
		45.0ft FAT CLAY (CH): bluish gray; moist; very stiff; with lenses of lignite.	19	80	23	23	24 / 128 / 31.2	
2050		2051.0 ft 47.5ft				21	28 / 150 / 36.5	
		FAT CLAY (CH): bluish gray; moist; very stiff to hard; fewer lignite seams than above.	20	80	21			
	50	50': possible slickensides.	21	100	21	21		
2045		2043.5 ft	22	100	42	42	24 / 93.9 / 133 / 29.8	
	55	55.0ft FAT CLAY (CH): gray; moist; hard.	23	80	33	33	24 / 104 / 21.2	
		2041.0 ft 57.5ft FAT CLAY (CH): gray to bluish gray; moist; very stiff.	24	100	28	28	20 / 117 / 20.5	Wire Piezometer-
2040	60	60': lenses of clayey sand and lignite.	25	80	30	30	19 / 86 / 19.6	Depth (BGS) of transducer tip: 57.1'
		2036.0 ft 62.5ft FAT CLAY (CH): gray; moist; very stiff.	26	100	50/ 4"		50/4" >> / 70 / 19.8	
2035		2035.5 ft 63.0ft						
	65	FAT CLAY (CH): gray; wet; hard; with thin lenses of lignite sediment. 65.5ft	27A	100			17 / 78 / 24.8	
		2033.0 ft 67.5ft	27B	100	31	31	86/6" >>	
2030		CLAYEY SAND (SC): gray; moist; dense; few silty sand seams; trace lignite sediment.	28	100	86/ 6"			
	70	70.0ft 2031.0 ft	29	100	36	36	24 / 115 / 23.1	
		LIGNITE: brown to black; moist.	30	100	34	34	19 / 100 / 21.7	
2025		2028.5 ft						
	75	FAT CLAY (CH): gray; moist; hard; trace lignite.	31	80	37	37	21 / 110 / 22.6	
2020			32	80	33	33	22 / 82 101 ☆ / 23.6	
	80	*Continued Next Page*						

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling 22.5

Remarks: Switched to mud rotary drilling at 32.5'. Set 85 mm inclinometer casing at completion of borehole.

Weather:

Boring B1

Project:
Job No.:
Location:
Coordinates:
Datum:

Surface Elevation: 2098.5 ft
Drilling Method: HSA/MR
Sampling Method: Continuous split-spoon sampling
Completion Depth: 120.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ (16, 32, 48, 64); REC%; RQD % ◆ (20, 40, 60, 80); SHEAR STRENGTH, tsf (0, 2.5, 5); NATURAL DRY DENSITY (pcf) ☆ (80, 100, 120); WATER CONTENT (%) × PL LL (60, 100, 140)	INSTRUMENT INSTALLATION DETAILS
	80	FAT CLAY (CH): gray; moist; hard; trace lignite. *(Continued)*			33	80	33	33; 22 100; 22.1	
2015		80': lenses of light gray fat clay.			34	100	35	35; 22 98; 25.2	
	85	82.5': 1/2" lignite seam.			35	80	36	36; 24 120; 25.4	
		2011.0 ft							
2010		LIGNITE: brown to black and gray; moist to wet; with interbedded lenses of fat clay; wet in lignite lenses. 87.5ft			36	100	74	74	
	90	2006.0 ft			37	100	65/8"	65/8" >>	
2005		FAT CLAY (CH): gray; moist; hard; with seams of lignite. 92.5ft			38	100	53	53; 22 96; 18.2	
	95	2003.5 ft							
		FAT CLAY (CH): bluish gray; moist; hard; with seams of lignite. 95.0ft			39	100	43	43; 18 75; 20.6	
2000		1998.5 ft			40	100	36	36; 18 80; 20.9	
	100	CLAYEY TO SILTY SAND (SC-SM): gray; moist; dense. 100.0ft			41	100	40	40	
		1996.0 ft							
1995		FAT CLAY (CH): bluish gray; moist; hard. 102.5ft			42A	100	44	44; 18 82; 20.6	
					42B	67		28 191; 27.8	
	105	1992.5 ft			43A	100	42	42; 19 94; 22.4	
		FAT CLAY (CH): bluish gray; moist; hard. 106.0ft			43B	100			
1990		1989.5 ft			44A	100	36	36	
		FAT CLAY (CH): gray; moist; hard. 109.0ft			44B	100		22 141; 24.1	
	110	1988.5 ft							
		110.0ft			45	100	35	35; 22 119; 23.4	
		FAT CLAY (CH): gray; moist; hard; few fine silt partings.			46A	100	43	43; 20 116; 27.3	
1985		112.5': lenses of lignite. 114.0ft			46B	100		20 101; 21.1	
	115	1984.5 ft							
		FAT CLAY (CH): gray; moist; hard; with lenses of silty sand. 115.0ft 116.0ft			47A	100	45	45; 19 107; 21.1	
		1983.5 ft			47B	100			
1980		SILTY TO CLAYEY SAND (SM-SC): gray; moist;			48	100	44	44; 19 105; 22.9	
	120	*Continued Next Page*							

4500 Vibrating Wire Piezometer-

Depth (BGS) of transducer tip: 97.1'

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
At Time of Drilling 22.5

Remarks: Switched to mud rotary drilling at 32.5'. Set 85 mm inclinometer casing at completion of borehole.

Weather:

Boring B1

Project:
Job No.:
Location:
Coordinates:
Datum: NAD 83

Surface Elevation: 2098.5 ft
Drilling Method: HSA/MR
Sampling Method: Continuous split-spoon sampling
Completion Depth: 120.0 ft

Elevation, feet	Depth, feet	MATERIAL DESCRIPTION	Graphic Log	Samples	Sample No.	% Recovery	SPT, N value or RQD %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ 16 32 48 64; REC%; RQD % ◆ 20 40 60 80; SHEAR STRENGTH, tsf 0 2.5 5	NATURAL DRY DENSITY (pcf) ☆ 80 100 120; WATER CONTENT (%) ✕ PL LL 60 100 140	INSTRUMENT INSTALLATION DETAILS
		dense; trace of lignite sediment. 120.0ft 1982.5 ft FAT CLAY (CH): gray; moist; hard. 1978.5 ft Bottom of Boring at 120.0 feet								1978.5

Date Boring Started:
Date Boring Completed:
Logged By:
Drilling Contractor:
Drill Rig:

Water Levels (ft)
▽ At Time of Drilling 22.5

Remarks: Switched to mud rotary drilling at 32.5'. Set 85 mm inclinometer casing at completion of borehole.

Weather: