

## SHANNON &amp; WILSON, INC.

Geotechnical Consultants

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00015

November 23, 1988

I-0161

Robert L. and Pearl E. Decker  
1428 Gilliam Way, #2  
Fairbanks, Alaska 99701

RE: BORINGS FOR SOIL QUALITY TESTING AND INSTALLATION OF GROUNDWATER  
MONITORING WELL. UNIVERSITY CAR CARE SERVICE STATION, FAIRBANKS STREET  
AND GEIST ROAD, FAIRBANKS, ALASKA

Dear Gentlemen:

In accordance with your request, six exploratory borings and one monitoring well were drilled and sampled at the referenced gasoline station on November 3 and 4, 1988. The primary purpose of this work was to obtain samples for soil and groundwater quality testing for the presence or absence of hydrocarbons. Boring locations are shown in attached Figure 1. Logs of the borings are shown in Figures 2 through 8.

#### Field Methods

The borings were drilled to a depth of 16½ feet, and the monitoring well to a depth of 20 feet using a truck-mounted drilling rig equipped with a continuous flight, hollow stem auger. Drilling operations were supervised and logged by Joan Welc-LePain, a geologist with our firm. As the borings progressed, soil samples were obtained at 5 feet, 10 feet, and at or near the water table (15 feet). Sampling was accomplished by driving a 3-inch O.D. split-spoon sampler 13 inches into the soil at the base of the auger with a 300-pound drop hammer falling 30 inches onto the drill rods. For each sample, the number of blows required to advance the sampler the final twelve inches is the penetration resistance and measures the relative consistency of unfrozen fine-grained soils and the relative density of unfrozen granular soils. Soil samples obtained using this technique were visually classified in the field, and sealed in airtight containers. A 250-ml bottle was filled for purgeable aromatics analyses, and another

DEC 6758

250-ml bottle for headspace screening for total volatile compounds present, from each sample.

The split-spoon samplers were cleaned with water and Liquinox (a laboratory-grade detergent), then rinsed with water and distilled water, between sampling attempts. The augers and drill rods were cleaned with high pressure hot water prior to each boring.

The monitoring well screen and casing were installed through the hollow stem auger after completion of Boring MW-1. Two-inch PVC pipe and ten feet of machine-slotted screen with threaded couplings was used, with the screened interval from about 9 to 19 feet. The natural formation materials were allowed to cave against the screen and casing for backfill. The well casing was sealed in the boring with both a bentonite pellet seal and a neat cement seal. Seal depths and other pertinent well construction details are noted on the attached boring log. Following installation, the well was developed by pumping at approximately 6 gpm for 15 minutes. The water in the well was sampled with a teflon bailer and sealed in two 40-ml bottles for purgeable aromatics analysis.

#### Subsurface Conditions

The site is covered with a possible 6½ to 8 feet of gravelly sand fill, which is underlain by sandy silt. The sandy silt is underlain by gravelly sand, generally at a depth of 11 to 13 feet.

Water table depth at the time of drilling ranged from 14 feet in Boring B-1 to 15½ feet in Borings B-2 and B-3. Groundwater was observed between these two depths in the remainder of the borings. Groundwater was measured at about 13 feet in MW-1. On November 21, 1983, the well was sampled for the presence of a floating hydrocarbon layer. A sheen was observed, but no measurable thickness. It should be noted that it has been our experience that it may take several weeks to perhaps a few months for the monitoring well to equilibrate with its surroundings and a floating product layer to develop.

Hydrocarbon odor was noted during drilling in all but Boring B-4. Sheen on the water within the samples was noted in Borings B-2, B-5, and MW-1. These occurrences are noted on the boring logs.

The soil samples obtained for headspace screening were returned to our office and allowed to equilibrate to room temperature. A Photovac "TIP" photoionization detector was then used to measure total volatile compounds present in the headspace of the sample jars, as a semi-quantitative indication of hydrocarbon contamination. The detector was calibrated to an isobutylene standard, with the readings mathematically corrected to a benzene standard. Headspace gas concentrations measured on the samples are presented in Table 1, rounded to single digit precision. These concentrations generally correlate with the location and intensity of odor noted during drilling. This data was used to select samples for submittal to the laboratory for analysis of purgeable aromatics (EPA Method 8020). Samples selected for testing are indicated with an asterisk. The results of the laboratory analyses from Northern Testing Laboratories are presented in Table 2.

In general, all borings at the site showed relatively high levels of contamination both above and at the water table, except for Boring B-4, which showed moderate levels. The dissolved hydrocarbon levels measured in the groundwater sample from Well MW-1 greatly exceed the current federal drinking water standards.

You are reminded that in accordance with Alaska statute 18AAC75.080, "a person in charge of a facility or operation shall notify a field office of the department [of Environmental Conservation] ...for any discharge of oil to the waters ... [or] the land of the state". We understand that the Northern Region office of ADEC has interpreted this to include underground evidence of spills, such as disclosed by this study. In addition, they have stated that the responsibility for reporting rests on the owner or operator of the facility, not on the consultant performing the study. Therefore Shannon & Wilson has not, and will not, disclose the results of this study.

Limitations

This report presents conclusions based on the drilling and sampling of a limited number of soil quality borings. The borings were intended to confirm the presence or absence of hydrocarbon contamination at the locations selected. The selection of locations was essentially random and therefore the levels observed may not necessarily be the greatest levels present at the site. It was also not the intent of our exploration to detect other than contamination by fuel products. No conclusions can be drawn on the presence or absence of other contaminants.

The observed levels of hydrocarbon contamination may be dependent on seasonal fluctuations of the groundwater table and/or the general passage of time, particularly if spills are ongoing or contaminants are migrating. The data presented in this report should be considered representative only of the time the data was collected.

This report was prepared for the exclusive use of the owner and our client in the study of the current problem. It should be made available to others for information on factual data only and not as a warranty of subsurface conditions, such as those interpreted from the boring logs and presented in discussions of subsurface conditions included in this report.

We trust that this information is sufficient for your needs at the present time. If you desire, we are available to perform additional exploratory work, or to assist with the design of remedial measures. If you have any questions, or if we can be of further assistance, please call.

Sincerely,  
SHANNON & WILSON, INC.

By



John E. Cronin  
Associate - Engineering Geology

Encls.

TABLE 1

HEADSPACE GAS CONCENTRATIONS  
(all readings in ppm)

<u>Sample #</u>	<u>Depth (feet)</u>	<u>Boring B-1</u>	<u>Boring B-2</u>	<u>Boring B-3</u>	<u>Boring B-4</u>	<u>Boring B-5</u>	<u>Boring B-6</u>	<u>Boring MW-1</u>
1	5.0-6.5	500	800	500	80	500	600	400
2	10.0-11.5	700	900*	700*	100	600	900*	700
3	15.0-16.5	800*	1000*	500*	200*	600*	900*	600*

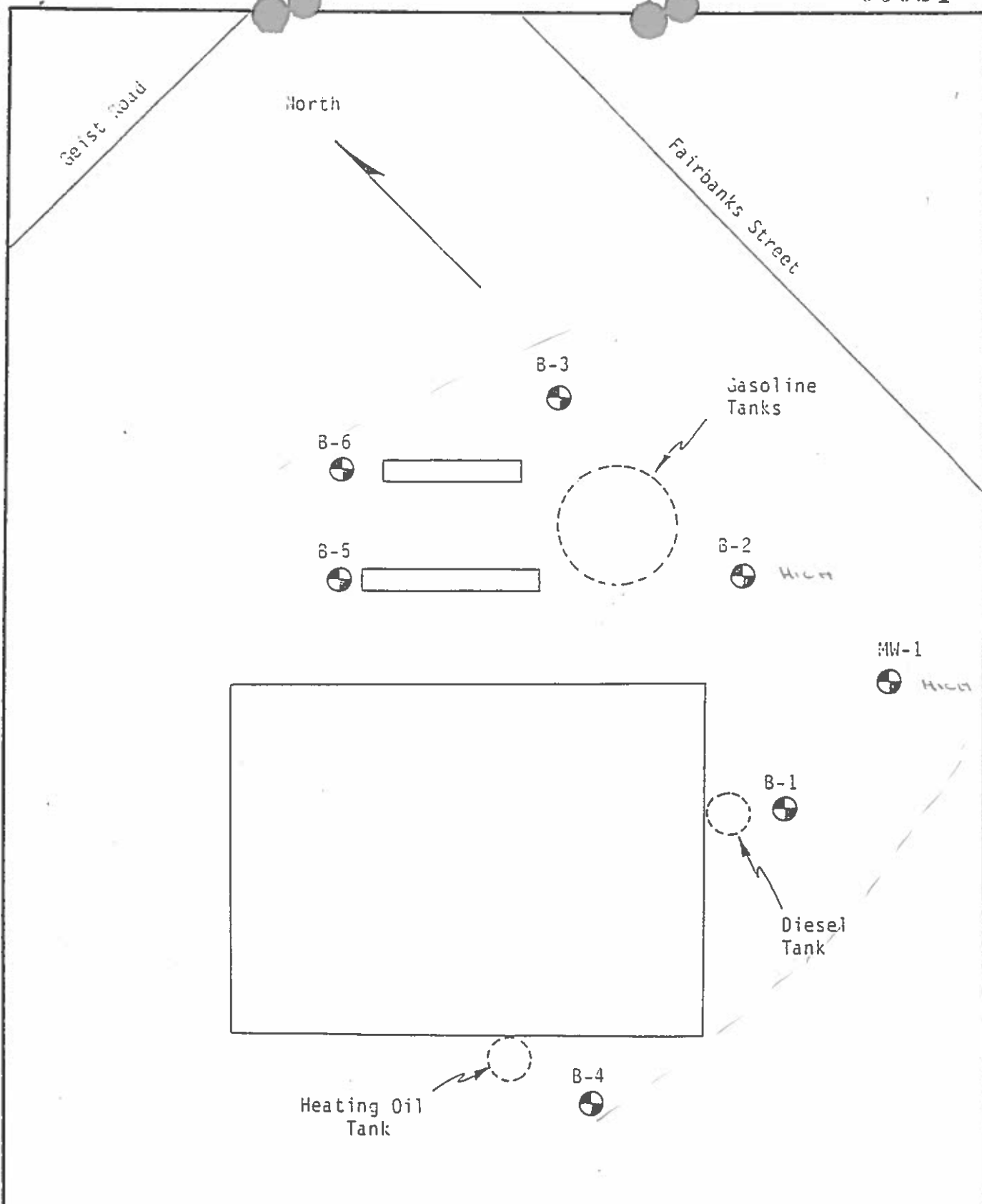
Note: Samples marked with asterisk designated for laboratory analyses.

TABLE 2  
 PURGEABLE AROMATICS CONCENTRATION IN SOIL (EPA METHOD 8020)  
 (all concentrations in ppm - dry weight basis)

<u>Boring</u>	<u>Sample</u>	<u>Depth (ft)</u>	<u>Benzene</u>	<u>Ethylbenzene</u>	<u>Toluene</u>	<u>Xylenes</u>
B-1	3	15.0-16.5	0.7	ND	1.1	0.8
B-2	2	10.0-11.5	1500	1500	7000	7100
B-2	3	15.0-16.5	10	5.4	21	22
B-3	2	10.0-11.5	20	110	278	440
B-3	3	15.0-16.5	82	190	540	760
B-4	3	15.0-16.5	0.8	0.3	0.4	1.2
B-5	3	15.0-16.5	47	55	160	260
B-6	2	10.0-11.5	1.0	12	5.2	21
B-6	3	15.0-16.5	5.7	7.4	19	31
MW-1	3	15.0-16.5	1.3	1.5	4.1	6.5

PURGEABLE AROMATICS IN WATER (EPA METHOD 602)  
 (concentrations in ppb)

MW-1	water	38,000	4,600	43,000	21,100
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Scale: 1 inch = 20 feet

Note: Tank locations schematic and approximate

Soil Quality  
 Fairbanks Street and Geist Road  
 Fairbanks, Alaska  
 BORING LOCATION PLAN

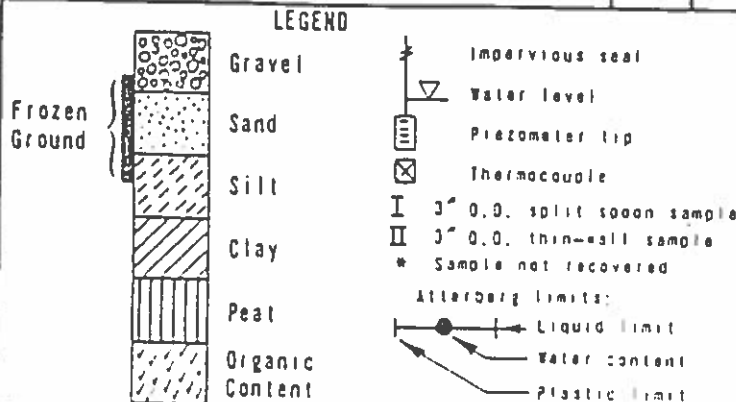
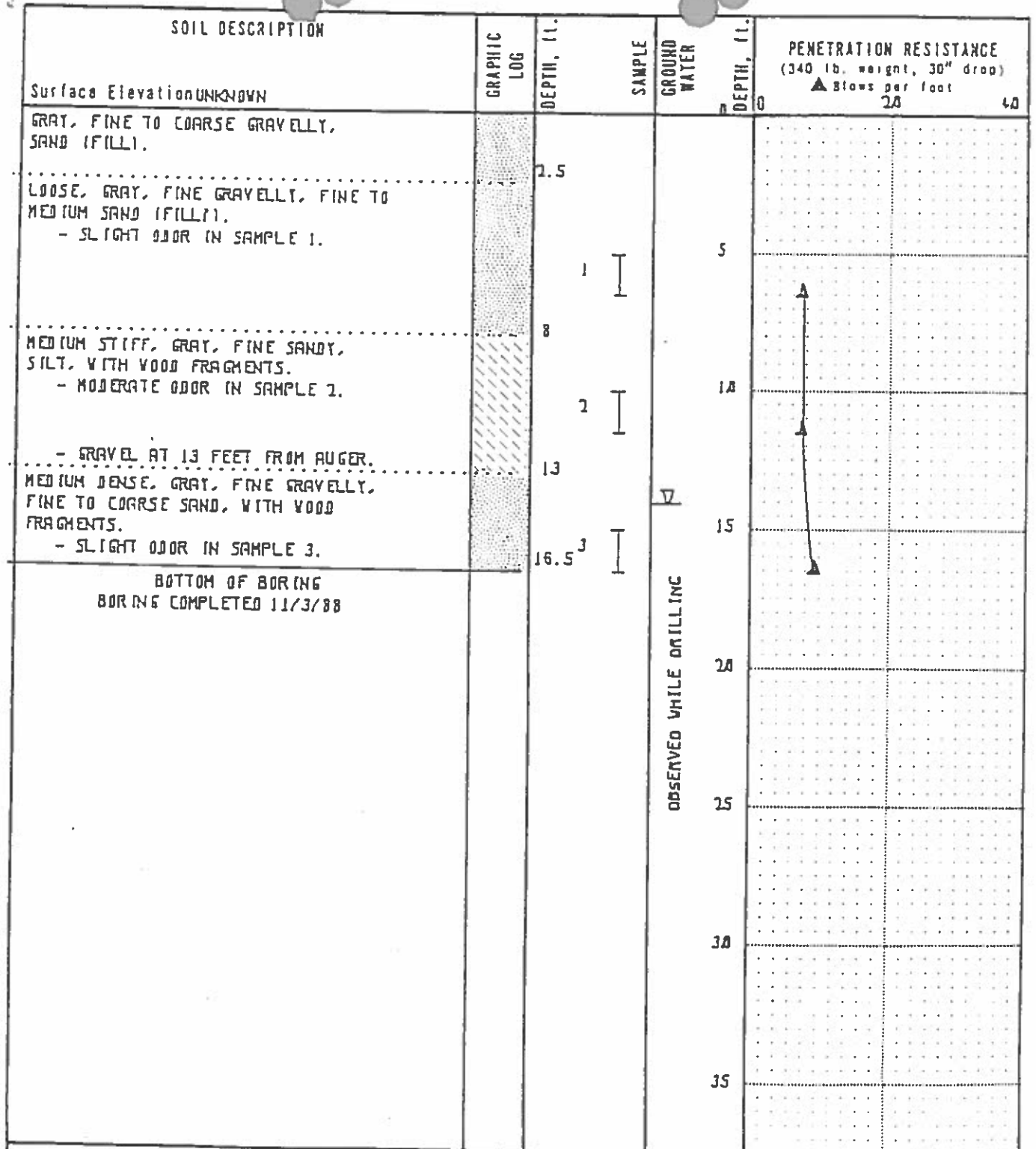
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FIG. 1



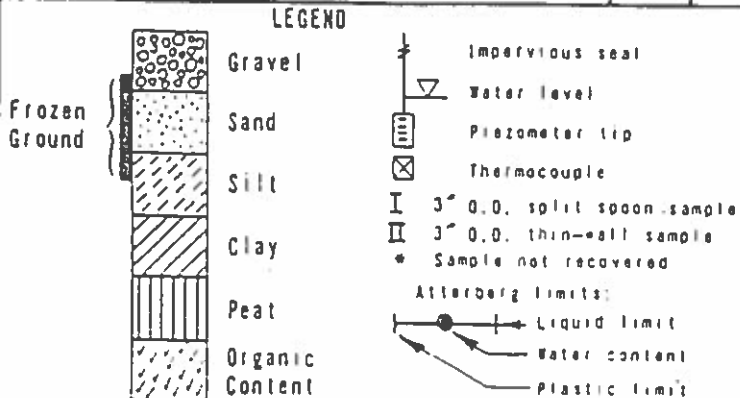
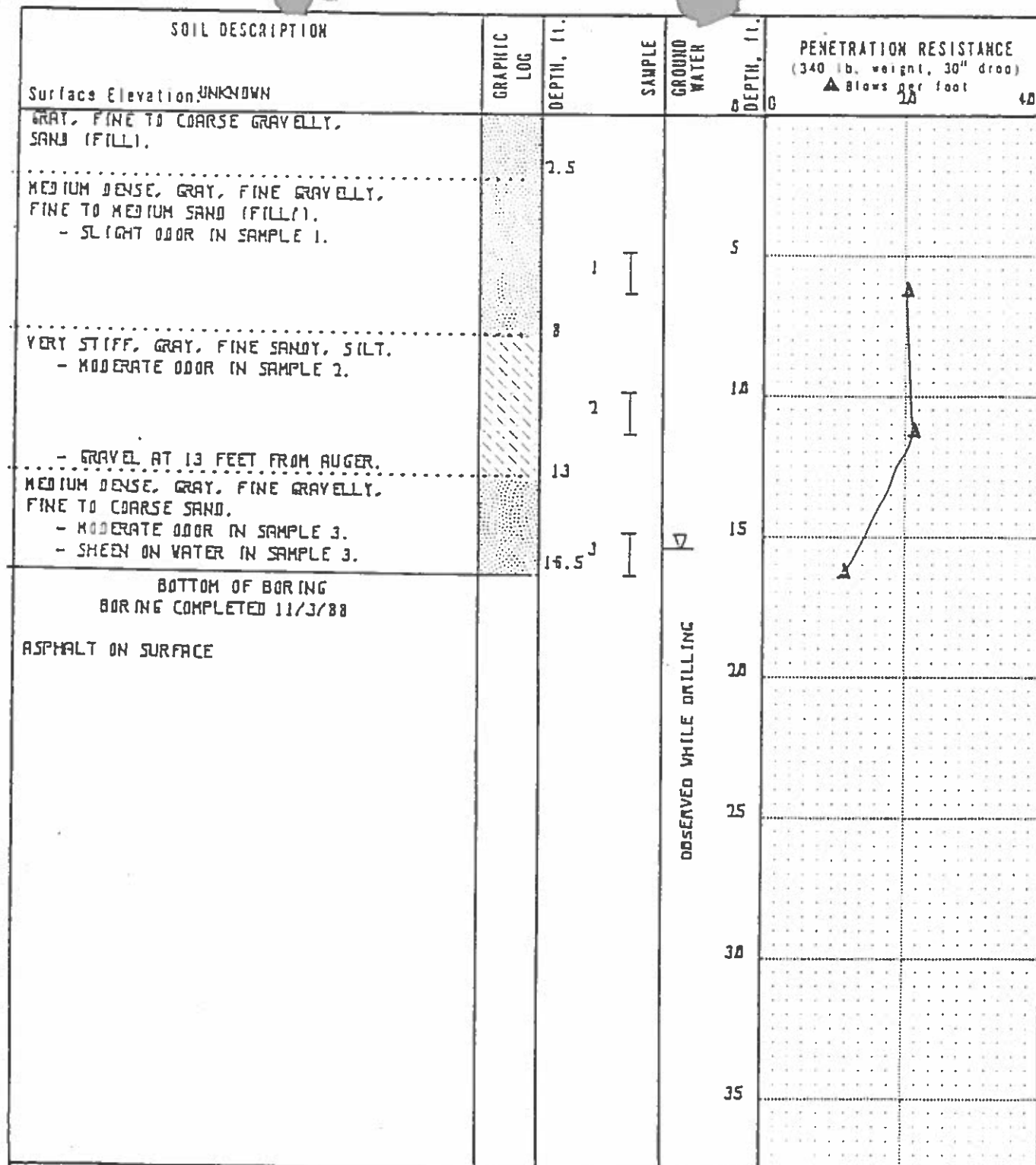
● % Water content

Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

ROBERT AND PEARL DECKER  
SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA  
LOG OF BORING NO. B-1

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● % Water content  
Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

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SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA

LOG OF BORING NO. B-2

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SOIL DESCRIPTION	GRAPHIC LOG	DEPTH, FT.	SAMPLE	GROUND WATER	DEPTH, FT.	PENETRATION RESISTANCE (340 lb. weight, 30" drop) ▲ Blows per foot
Surface Elevation UNKNOWN					0	20 40
GRAY, FINE TO COARSE GRAVELLY, SAND (FILL).  LOOSE TO MEDIUM DENSE, GRAY, FINE GRAVELLY, FINE TO COARSE SAND (FILL). - SLIGHT ODDOR IN SAMPLE 1.		2.5  5	1		5	
STIFF, GRAY, FINE SANDY, SILT, WITH ROOTS, LAMINATED. - SLIGHT ODDOR IN SAMPLE 2.		8  12	2		12	
MEDIUM DENSE, GRAY, FINE GRAVELLY, FINE TO COARSE SAND. - MODERATE ODDOR IN SAMPLE 3. - SHEEN ON WATER IN SAMPLE 3.		13  16.5	3	▽	15	
BOTTOM OF BORING BORING COMPLETED 11/3/88				OBSERVED WHILE DRILLING	20	
ASPHALT ON SURFACE					25  30  35	

**LEGEND**

Frozen Ground

- Impervious seal
- Water level
- Piezometer tip
- Thermocouple
- I 3" O.D. split spoon sample
- II 3" O.D. thin-wall sample
- Sample not recovered

Atterberg limits:

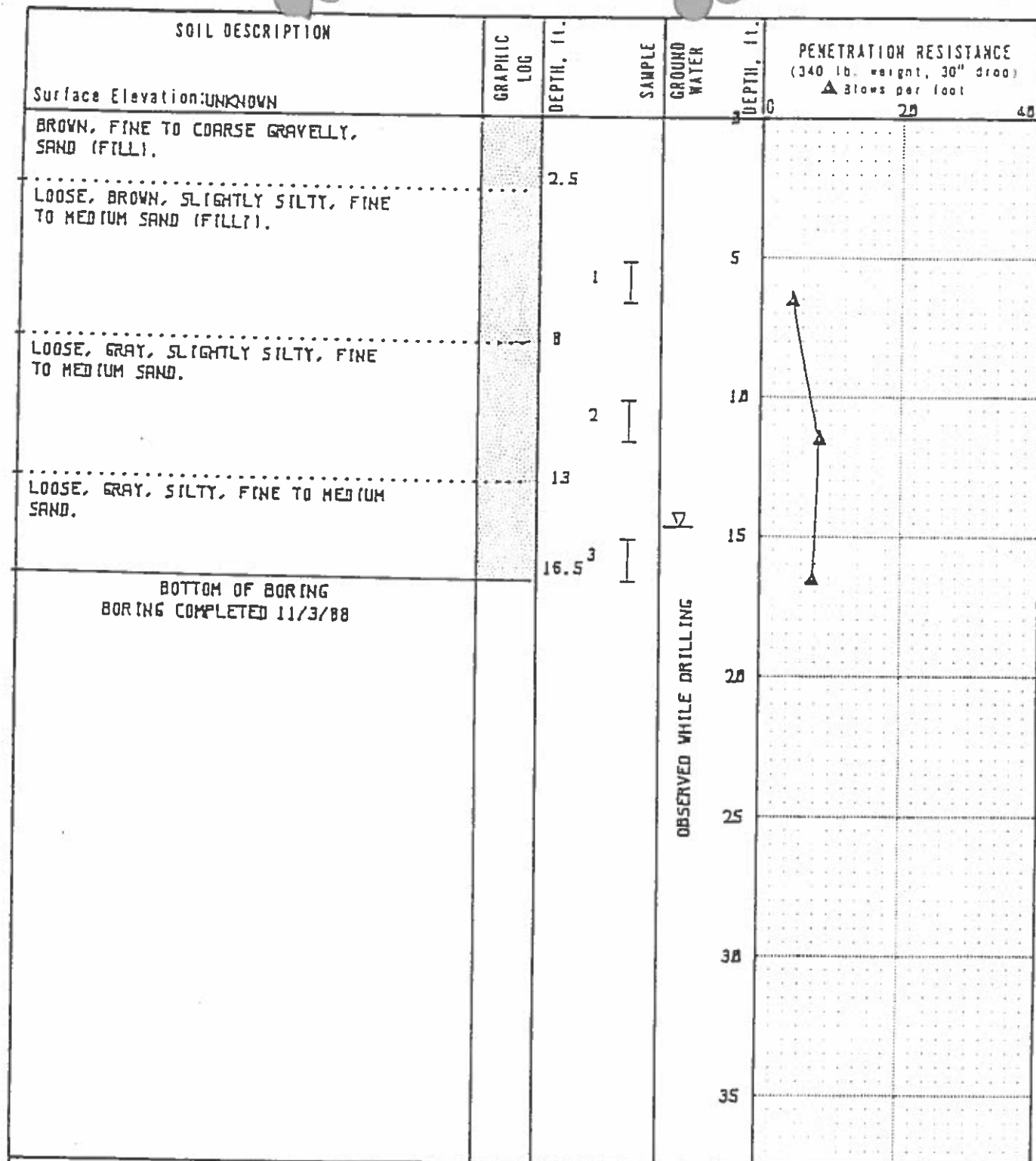
- Liquid limit
- Water content
- Plastic limit

● % Water content 20 40

Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

**ROBERT AND PEARL DECKER**  
SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA  
LOG OF BORING NO. B-3

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**LEGEND**

Gravel  
Sand  
Silt  
Clay  
Peat  
Organic Content

Impervious seal  
Water level  
Piezometer tip  
Thermocouple  
I 3" O.D. split spoon sample  
II 3" O.D. thin-wall sample  
\* Sample not recovered

Atterberg limits:  
Liquid limit  
Water content  
Plastic limit

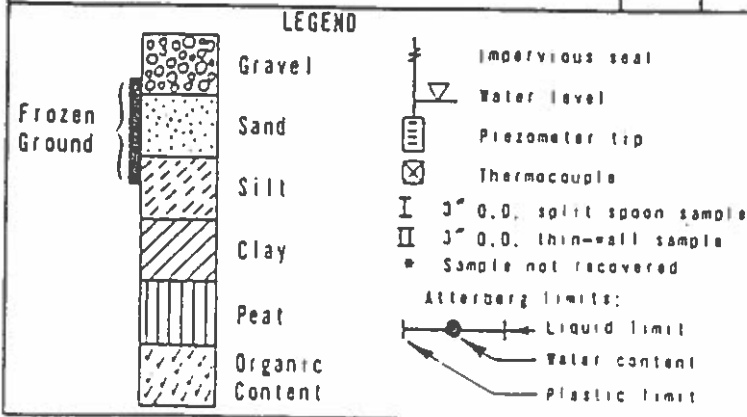
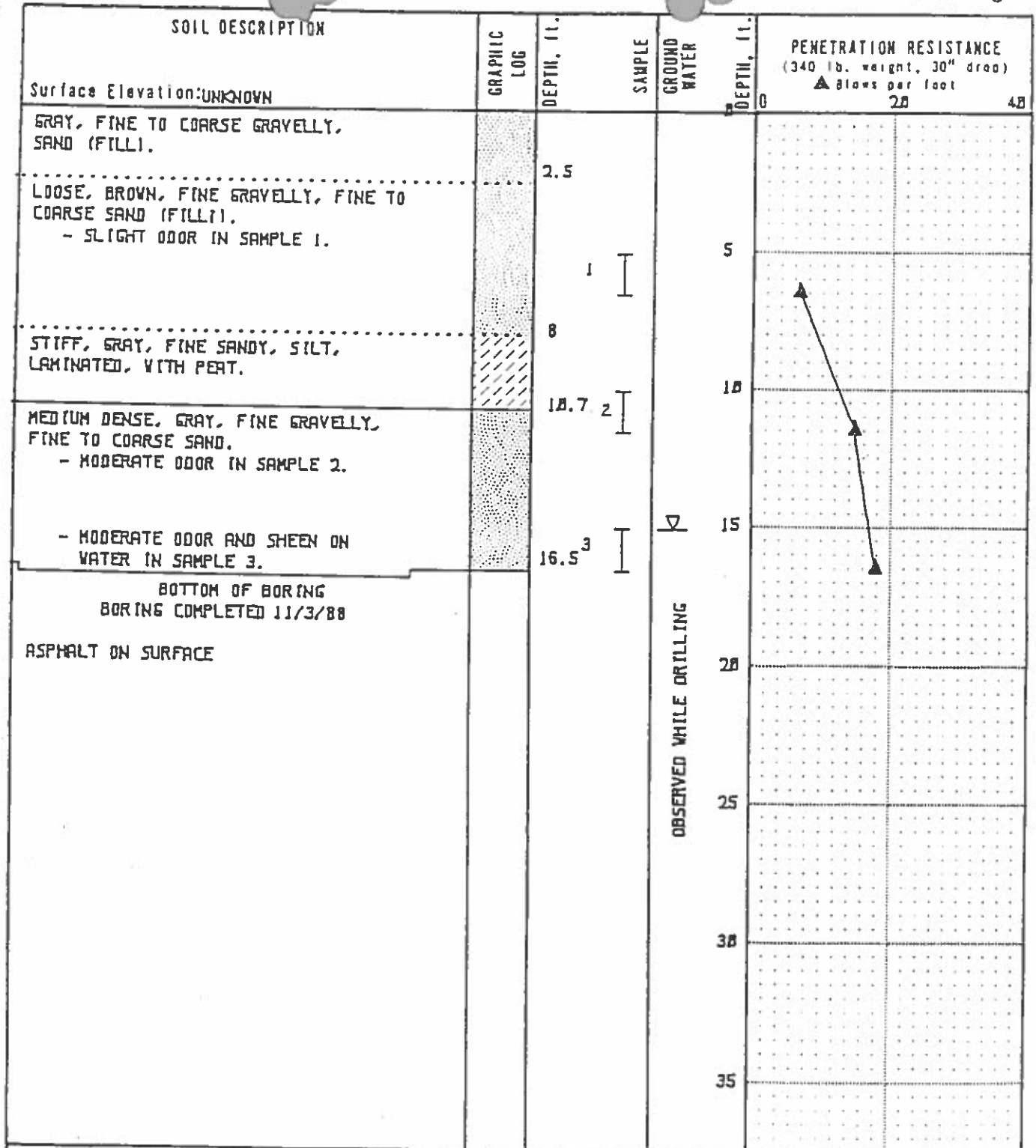
● % Water content

Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

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SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA  
LOG OF BORING NO. B-4

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X-161



20 40

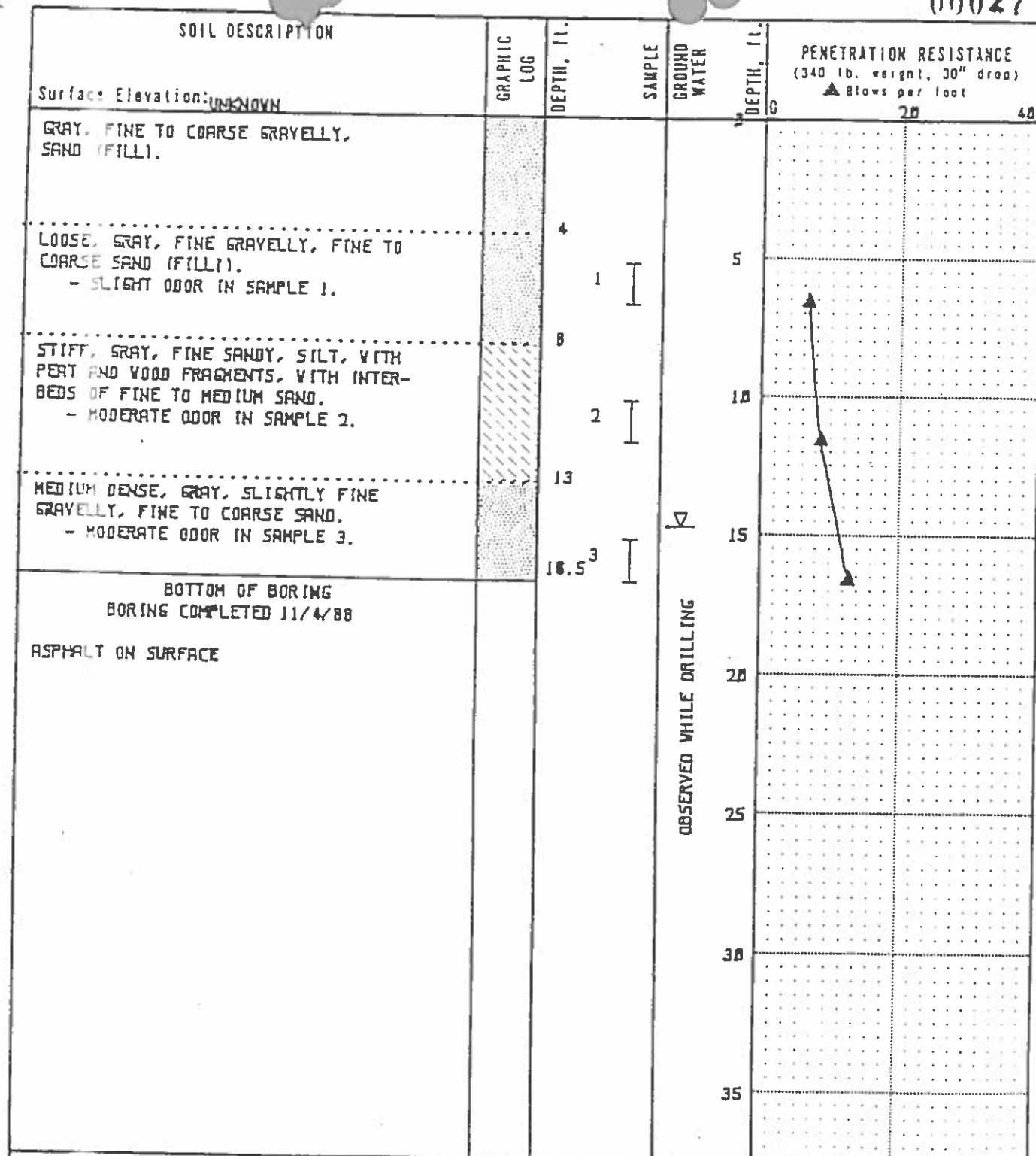
● % Water content

Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

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SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA  
LOG OF BORING NO. B-5

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DEC 6769  
X-151



**LEGEND**

	Gravel		Impervious seal
	Sand		Water level
	Silt		Piezometer tip
	Clay		Thermocouple
	Peat		3" O.D. split spoon sample
	Organic Content		3" O.D. thin-wall sample
		*	Sample not recovered

Alterberg limits:

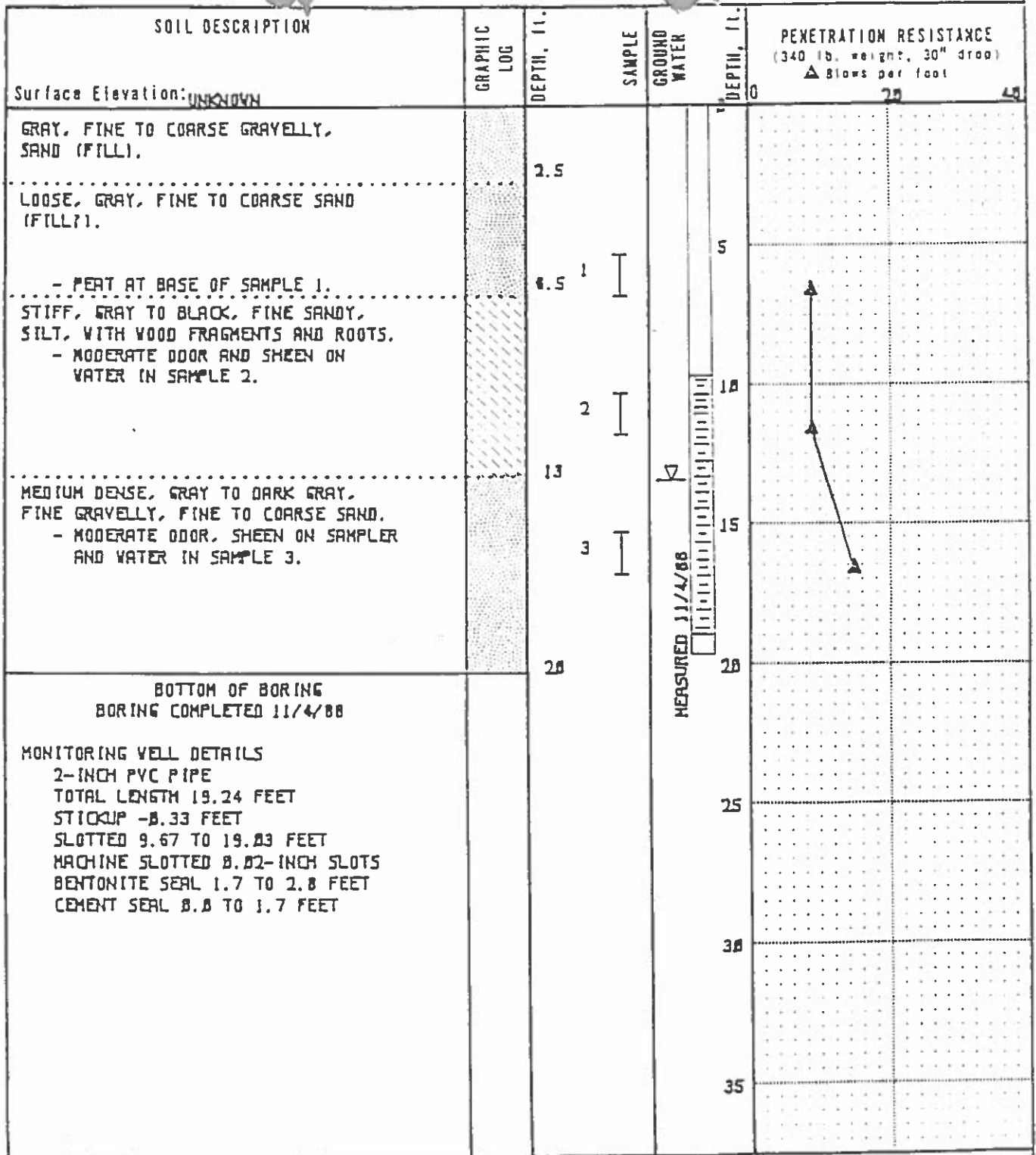
● % Water Content

Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

ROBERT AND PEARL DECKER  
 SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
 FAIRBANKS, ALASKA  
 LOG OF BORING NO. B-6

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DEC 6770  
 X-181



**LEGEND**

	Gravel		Impervious seal
	Sand		Water level
	Silt		Piezometer tip
	Clay		Thermocouple
	Peat	I	3" O.D. split spoon sample
	Organic Content	II	3" O.D. thin-wall sample
		*	Sample not recovered

**Atterberg limits:**

- Liquid limit
- Water content
- Plastic limit

**Frozen Ground** (indicated on the left side of the log)

**Note:** The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

● % Water Content

ROBERT AND PEARL DECKER  
SOIL QUALITY - FAIRBANKS ST. & GEIST RD.  
FAIRBANKS, ALASKA  
LOG OF BORING NO. MW-1

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