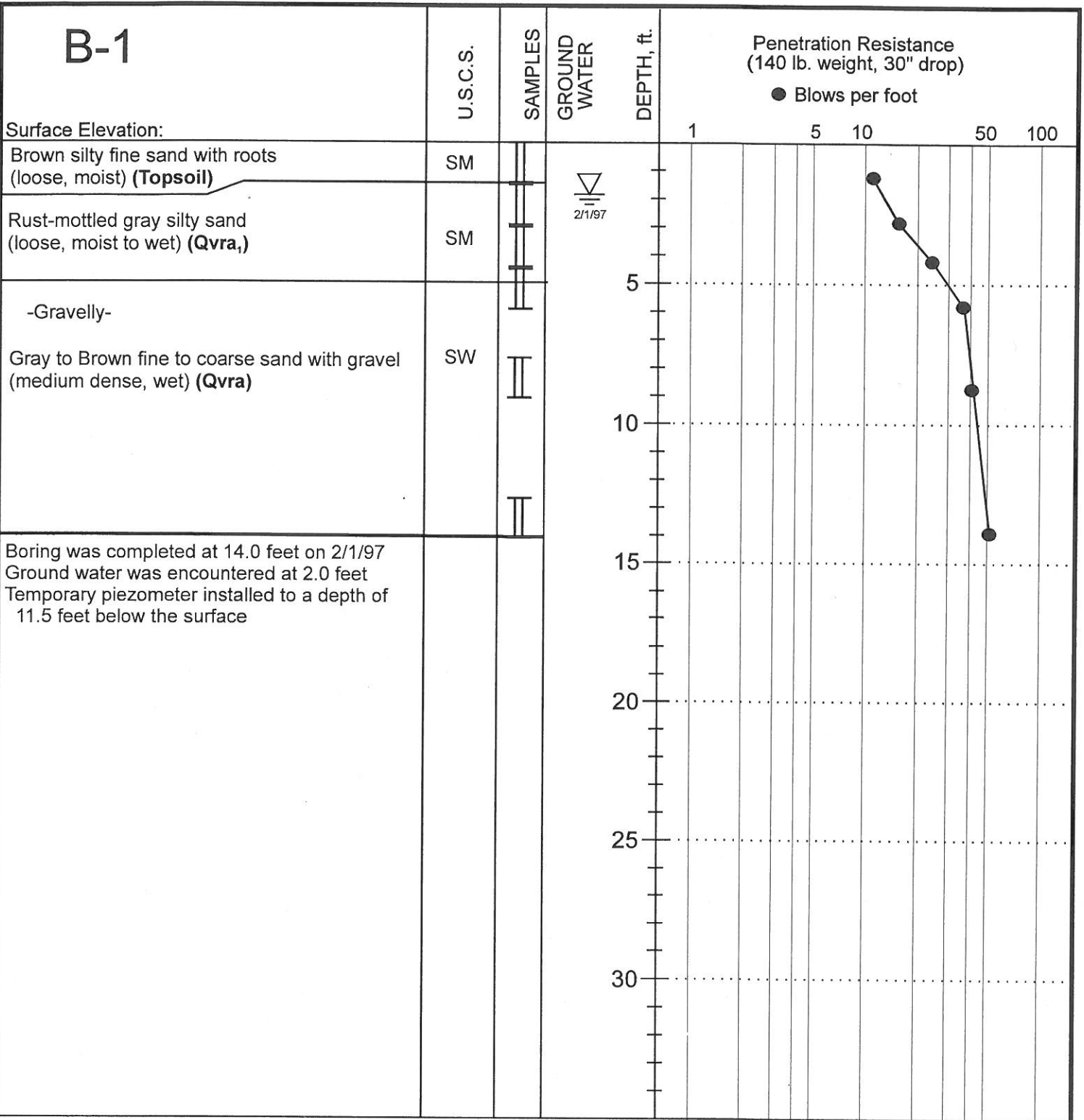


# B-1



## LEGEND

- |  |                            |   |                  |  |                 |    |                                      |
|--|----------------------------|---|------------------|--|-----------------|----|--------------------------------------|
|  | 2" O.D. split spoon sample | * | Liquid limit     |  | Impervious seal | P  | Sample pushed                        |
|  | 3" O.D. split spoon sample | ■ | Moisture content |  | Water level     | TV | Torvane reading, tons/ft             |
|  |                            | + | Plastic limit    |  | Piezometer tip  | PP | Pocket penetrometer reading, tons/ft |

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

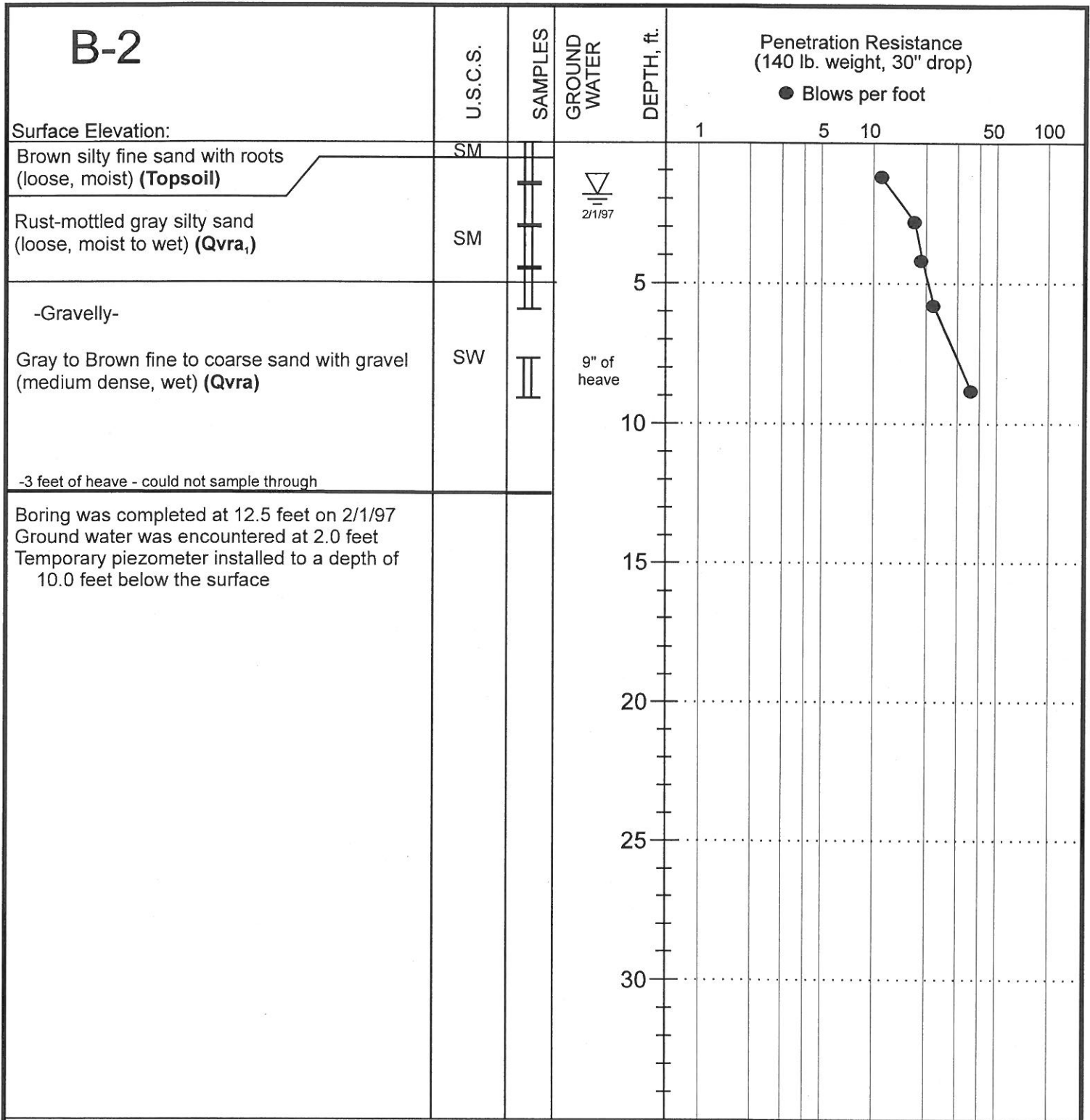
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FIGURE  
A-12

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February 1997



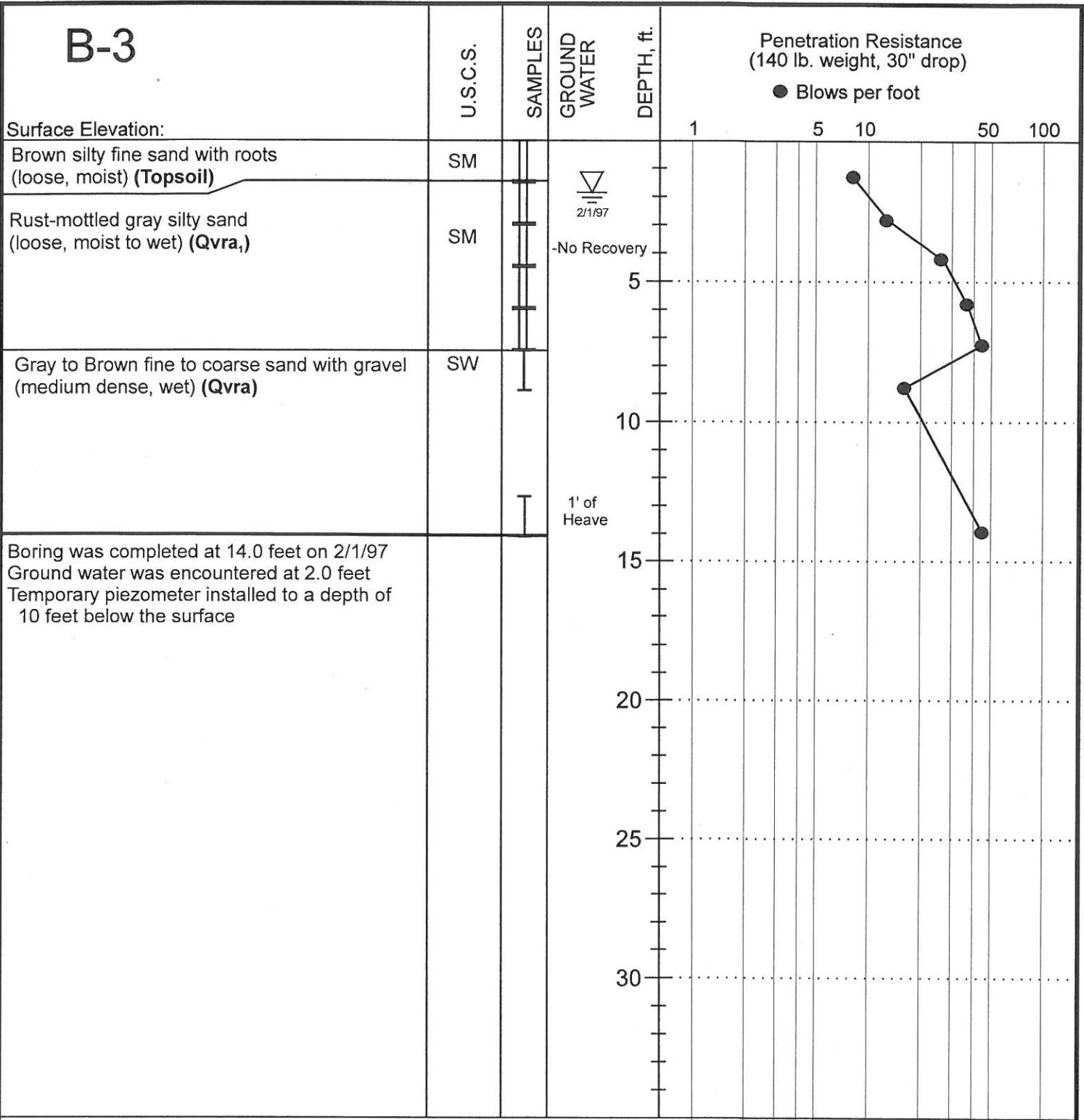
### LEGEND

I 2" O.D. split spoon sample	* Liquid limit	⚡ Impervious seal	P Sample pushed
II 3" O.D. split spoon sample	■ Moisture content	▽ Water level	TV Torvane reading, tons/ft
	+ Plastic limit	■ Piezometer tip	PP Pocket penetrometer reading, tons/ft

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

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	FILE NO. 192796	DATE February 1997

# B-3



## LEGEND

I 2" O.D. split spoon sample

\* Liquid limit

Impervious seal

P Sample pushed

II 3" O.D. split spoon sample

■ Moisture content

▽ Water level

TV Torvane reading, tons/ft

+ Plastic limit

■ Piezometer tip

PP Pocket penetrometer reading, tons/ft

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

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FIGURE

A-14

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## APPENDIX B

### LABORATORY TESTING

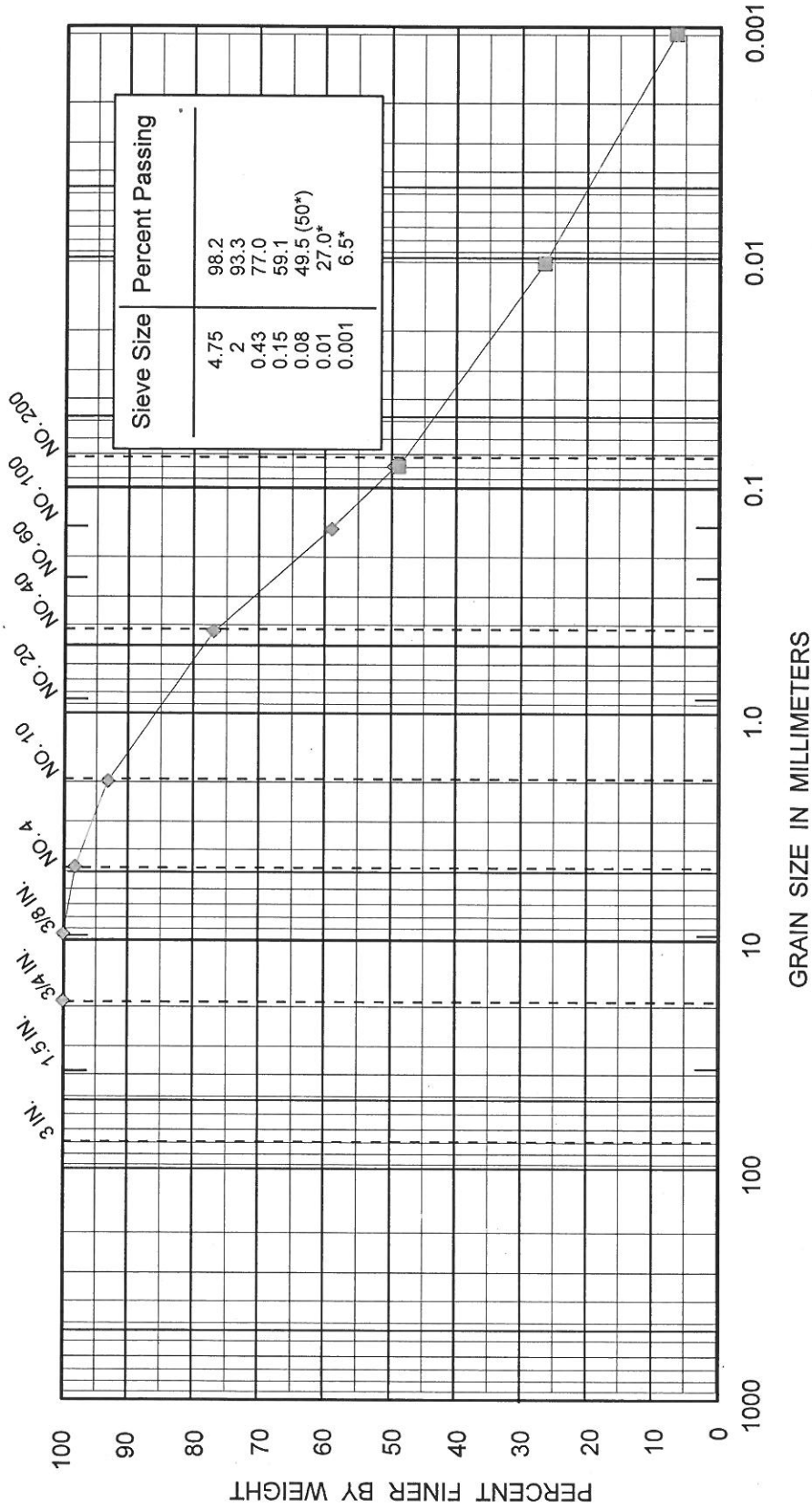
The purpose of our laboratory testing program is to establish the engineering properties of the mudflow deposit. The testing included grain size analysis, including both sieve and hydrometer testing, Atterburg Limits tests, direct shear and consolidation testing. The grain size testing was primarily intended to evaluate the quantity of the fine (material passing the No. 200 sieve) content of the soil. The percent fines will provide an indication of the soils workability during construction and its sensitivity to moisture. Clay content also provides an indication of its workability. In general, the more fines the more difficult the material is to work with. The higher the clay content, as opposed to silt content, again the more difficult the material is to work with. Clay content is estimated by the amount finer than the 0.002 mm as shown on the hydrometer plots. Clays have different properties depending on their type. The Atterburg limit tests are used to evaluate the mechanical properties of the clays.

The results of the grain size tests are presented in Figures B-1 through B-3. These test indicate that the fines content of the mudflow can vary from 40 to 50 percent with clay content from 10 to 13 percent. The mechanical properties of the mudflow, as determined by the Atterberg Limit tests indicate that it is a low plastic material. The results of the Atterberg Limit tests are shown on Figure B-4.

The direct shear tests required some interpretation of the data, as typical plots did not "break" in the classical fashion. We suspect that this is in part due to the small pebbles within the soil matrix. The tests were interpreted by taking the first indication of the stress strain curve deviating from straight line as the yield point of the soil. Using this data, a normal stress versus shear stress plot was developed. This plot provided a shear strength of the soil at about 27 degrees. This value is appropriate for a silt type soil, which indicates that with respect to shear strength the mudflow will behave more like a silt than a sand. The shear strength plot is shown on Figure B-5.

A consolidation test was run on what was considered to be the "softest" sample retrieved from the field. This is considered conservative with respect to evaluating potential settlement of the mudflow. The consolidation test plot is presented in Figure B-6. An engineering consolidation coefficient of 0.03 was determined from this graph. This value is expected to calculate settlements within normal building tolerances, providing it is not disturbed and the recommendations provided in the text of this report are followed.

U.S. STANDARD SIEVE SIZE



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH	SOIL DESCRIPTION

\*Percent passing based on hydrometer test results.

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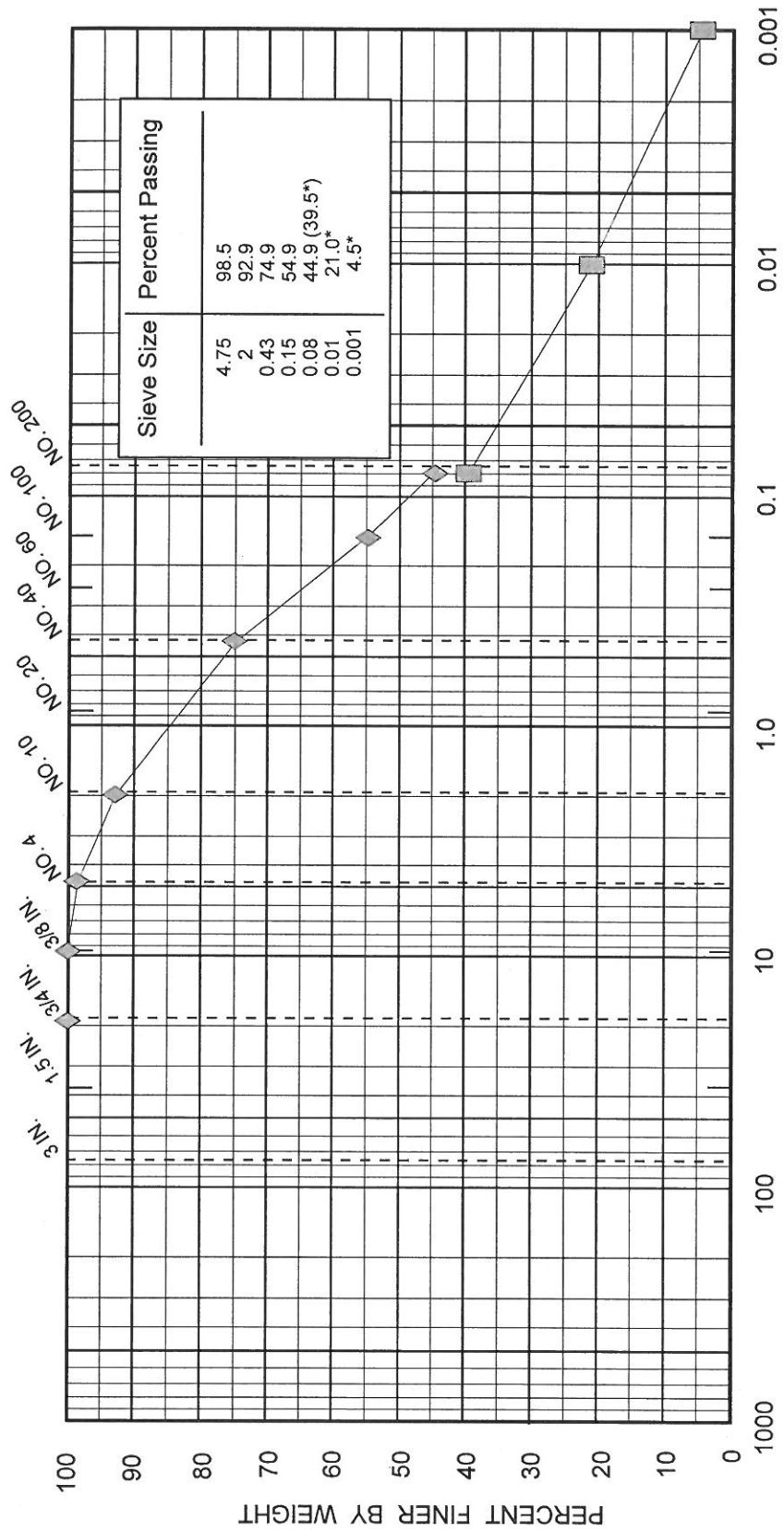
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FIGURE B-1

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U.S. STANDARD SIEVE SIZE



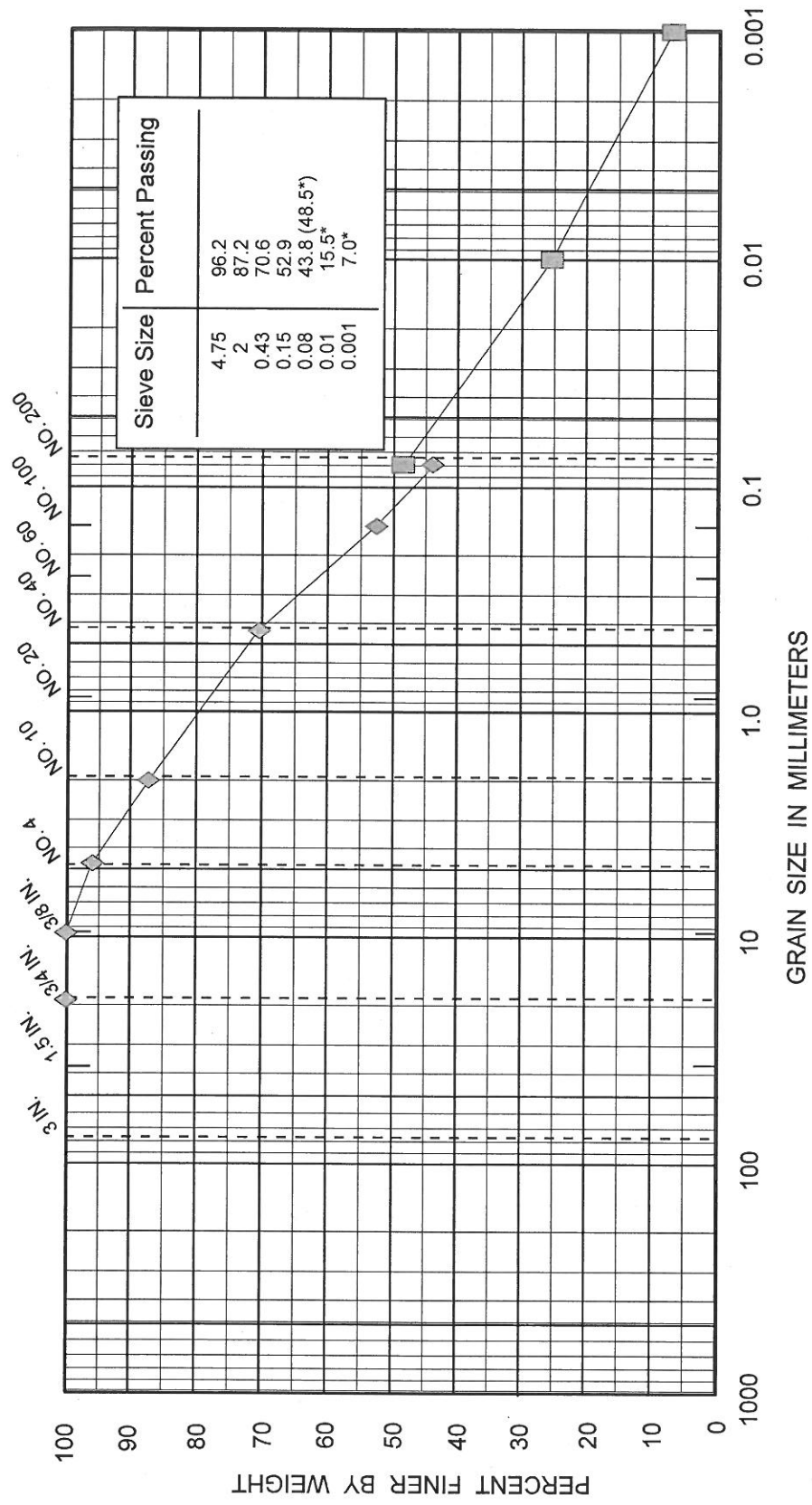
GRAIN SIZE IN MILLIMETERS

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL		EXPLORATION NUMBER	SAMPLE DEPTH	SOIL DESCRIPTION
◆	(Wet Sieve)	TP-2	2.0'	Rust-mottled gray silty sand
■	(Hydrometer)			

\*Percent passing based on hydrometer test results.

U.S. STANDARD SIEVE SIZE

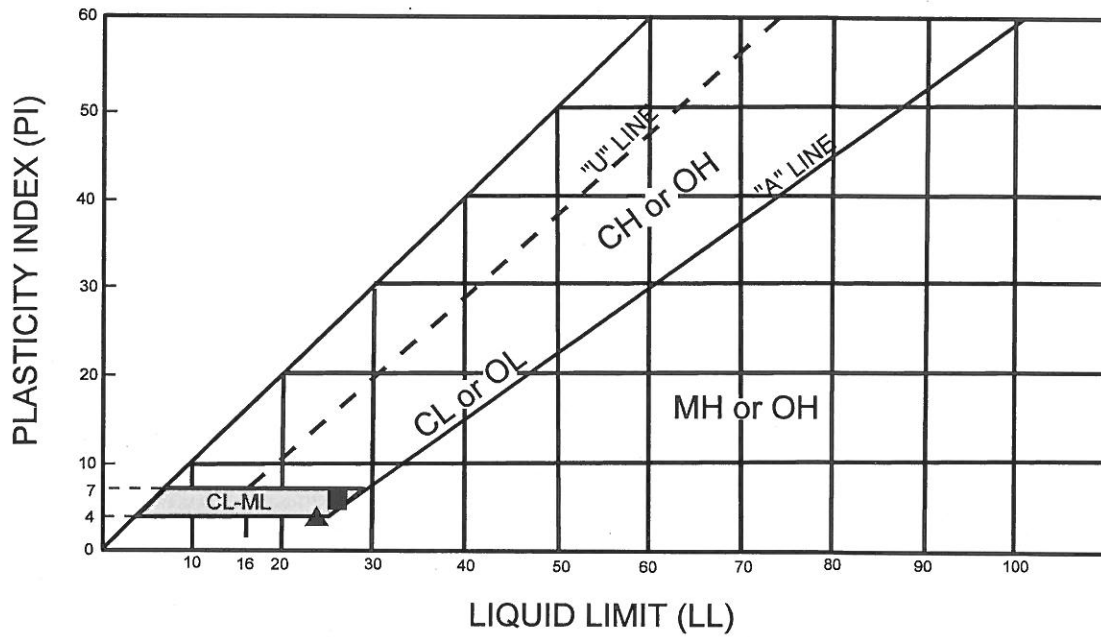


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	EXPLORATION NUMBER	SAMPLE DEPTH	SOIL DESCRIPTION
◆ (Wet Sieve)			
■ (Hydrometer)			

\*Percent passing based on hydrometer test results.

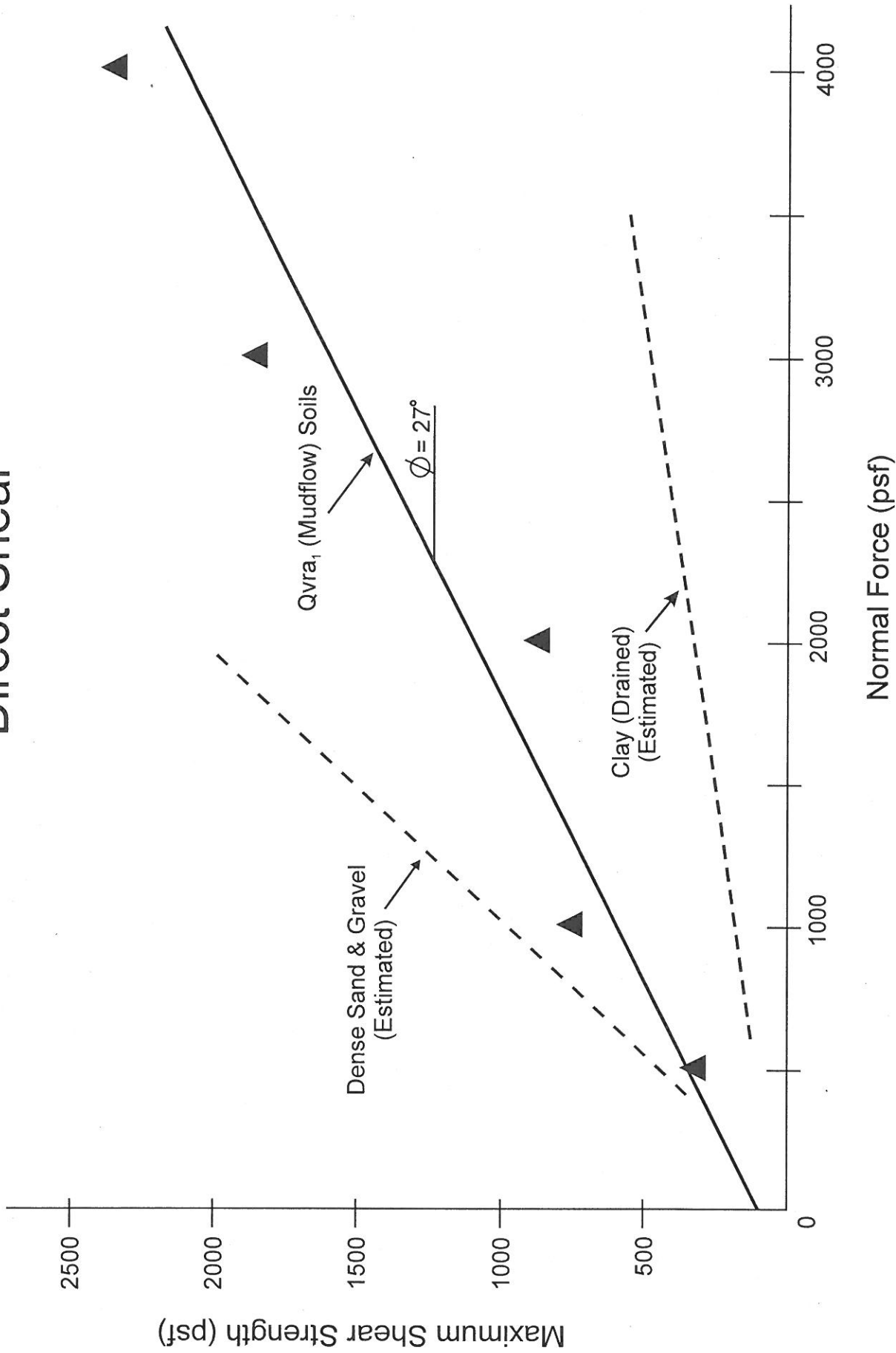
# ATTERBERG LIMITS



Symbol	Sample	Plastic Limit	Liquid Limit	Plasticity Index	USC Symbol
	TP-2 @ 2.0'	32.8	24.3	-8.5	SM
■	TP-4 @ 3.5'	20.3	26.0	5.7	SM
▲	TP-18 @ 2.0'	20.0	23.8	3.8	SM



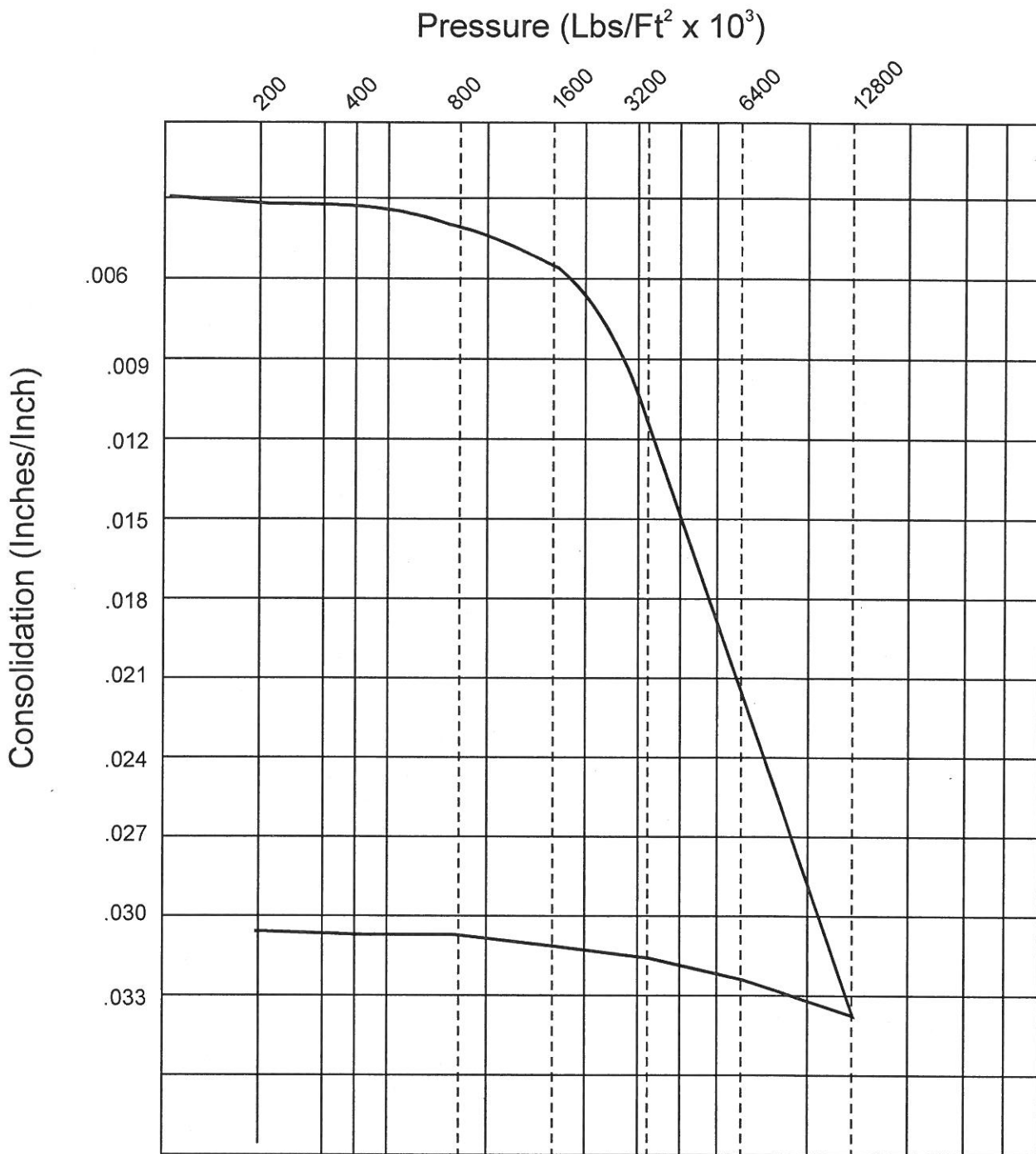
# Direct Shear



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FIGURE B-5  
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Symbol	Exploration Number	Sample Depth	U.S.C.S.	Moisture Content
	B-3	4.5-6.0	SM	22.3% Before Test 18.3% After Test