REPORT ON SOILS AND FOUNDATION INVESTIGATION

SEATTLE FIRST NATIONAL BANK
ABERDEEN BRANCH

ABERDEEN, WASHINGTON

W-896-40

OCTOBER 1972

By

GEOLABS-WASHINGTON, INC.
12893 N. E. 15th Place
Bellevue, Washington

OCT 26 1972

I. INTRODUCTION

This report presents the results of our soils and foundation investigation for the proposed Aberdeen branch of the Seattle First National Bank in Aberdeen, Washington. The purpose of this investigation was to determine subsurface conditions at the site and to recommend foundation design considerations from the gathered subsurface data. The investigation consisted of a series of six deep subsurface borings, laboratory tests and engineering analyses of the acquired data.

The investigation was conducted in general accordance with our letter of proposal dated August 11, 1972. Authorization to proceed was received from the bank in the form of Purchase Order No. A 3017 dated August 16, 1972.

II. SITE DESCRIPTION AND PROPOSED PROJECT

The proposed bank will occupy the southeast corner of the intersection of Broadway and Market Streets in Aberdeen, Washington. During our field investigation, several reinforced concrete structures occupied the site, including the present SeaFirst Bank building and a parking garage. Fuel tanks were buried at the east side of the site between the library and the parking garage.

Present plans call for the removal of the existing buildings and erection of a combination two-story and four-story structure. The bank is to be constructed of a steel frame with concrete panels and exterior. The

two-story portion of the project is to provide parking and drive up banking windows. Column loads are expected to range from 150 to 1400 kips (combination dead and live loads).

III. SUBSURFACE EXPLORATION

Our exploration program was formulated to define the subsurface and water conditions in the area of the proposed bank structure. To define the subsurface conditions, six test borings were advanced. The approximate locations of the borings are shown on Plate 1; the boring logs are presented on Plates A-1 through A-18.

All six of the borings were performed using a truck mounted, continuous flight, hollow stem auger. All of the borings penetrated to 89 feet with the exception of Boring No. 5 which penetrated to 91 feet below the ground surface.

Standard Penetration Test samples were obtained at 2.5 feet and five foot intervals in each of the borings. This test consists of driving a 2-inch O.D. split spoon sampler into undisturbed soil below the tip of the auger with blows from a 140-pound hammer dropped 30 inches. The number of blows required to produce a penetration of 12 inches is defined as the Standard Penetration Resistance (N value) which was recorded for each sample. These blow counts are plotted on each boring log and provide an empirical means of evaluating soil density or consistency. The material obtained by this sampling procedure was placed in airtight jars and returned to our laboratory for testing and re-examination.

In addition to the disturbed samples, undisturbed samples were taken in the cohesive soils encountered on the site. These samples were obtained by hydraulically pushing a 3-inch O.D. thin walled sampler into the undisturbed soil beneath the auger. As these tubes were removed from the ground, Torvane shear strength measurements were taken immediately on the material at the tube ends. The Torvane readings are shown on the boring logs. The soils tested were classified by our engineering geologist and then the tubes were sealed with mycrocrystalline wax to prevent dessication. These undisturbed samples were also returned to our laboratory for detailed examination, classification, and testing.

IV. SUBSURFACE CONDITIONS

The entire surface of the project site was paved at the time of our investigation. The underlying soil conditions could be grouped in a series of four horizons. The first horizon appeared to be a thin layer of fill consisting of two to four feet of brown to gray, sandy, silty clay with fine silty sand.

The second horizon consisted of soft, tan to gray clay with peat and sawdust interbeds. This horizon ranged in thickness from seven to fifteen feet. Horizon three consisted of very soft to soft, gray, sandy, silty clay or clayey silt, and very loose to loose, silty, fine sand. A layer of gravel was encountered within the clay at about sixty-five to seventy-five feet in depth. This clay horizon ranged in thickness from forty-five to sixty feet. The clay beds in this horizon had thin, fine sand zones throughout, much like a seasonal deposition cycle. The last soil

type encountered was a medium stiff to stiff, tan, sandy, silty clay. This clay contained some organic debris such as scattered peat fragments.

The apparent water table, where encountered, varied between four and thirteen feet below the surface. During the drilling period, methane gas was observed bubbling up around the auger. In Boring No. 6, the amount of gas was such that it could sustain burning after ignition.

In general, the sediments encountered in the test borings could be dated as being placed during and after the last ice advance. Deposition of the material encountered took place as sea level rose during the recession of the continental ice sheet.

V. DESIGN CONSIDERATIONS

A. General

Due to the soft, compressible nature of the project soils, a conventional foundation does not appear to be suitable for this building. Instead, building support must be gained with depth. Our studies have been limited to driven, friction piles. Long, end bearing piles driven to bedrock is another possibility. However, no such bearing stratum was found in our six borings, and bedrock is expected to be in excess of one hundred feet below the surface.

B. Pile Foundation

1. Pile Capacities

Based on our investigation, we recommend a system of friction piles for structure support. Timber piles with an average diameter of twelve inches should be capable of safely supporting twenty tons each (dead load and

live load) when driven to an embedment of seventy feet. We feel that, for the heavier columns, pile capacities of at least twenty tons should be specified. Since the majority of the load on each pile is to be carried by skin friction, the allowable load would vary nearly linearly with embedment (within limits). Typical embedment vs. allowable load values are presented on Plate 2.

2. Pile Types

We recommend using treated timber piles with tip diameters of at least seven to eight inches. Timber affords desirable adhesion with adjacent soil and the tapered nature of timber piles provides an increased lateral earth pressure coefficient.

3. Pile Spacing

In the case of cohesive soils, such as those found at this site, the bearing capacity of the entire pile group must be considered in addition to the capacity of a single pile. Rather than employing an efficiency formula, we feel that a review of the group capacity considering the pile cluster as a deep footing is more applicable. To evaluate the ultimate capacity of a pile group, the following expression is suggested:

$$Q_u = (\text{perimeter of pile group})(\text{depth of pile embedment})(0.35 \text{ kips/ft.}^2) + (\text{area of pile group})(0.5 \text{ ksf})(N_c)$$

where $N_c = 5\left(1 + \frac{D}{5B}\right)\left(1 + \frac{L}{5B}\right)$

when

D = total depth of piles

B = overall width of pile group

L = overall length of pile group

$\frac{D}{B}$ should not be assumed to exceed 2.5 in assessing the bearing capacity factor N_c

(from Moorhouse & Sheehan, 1968)

Generally for the large pile groups, a spacing of 3.5 feet, on centers, appears to be sufficient for a 100% "efficiency".

4. Settlements

The second part of any foundation evaluation involves settlements. Total settlements of the heavier columns are expected to be on the order of 1.75 - 2.25 inches, while the lightest columns could settle 0.5 - 1.0 inches. Differential settlements could amount to as much as 1.5 inches. The settlement characteristics of the fine grained project soils are such that the total settlements indicated here should take place over a period of several years.

If the above differential settlements are unacceptable, some decreases of this amount can be provided by varying pile lengths and spacing. That is, the lighter portions of the building could be supported by shorter piles which would tend to settle more like the heavy column - long pile sutuation. We would be willing to work with the structural engineer in this case and would need additional structural load information.

5. Floor Treatment

Our studies show that a slab-on-grade, loaded with a typical office building live load, could settle several inches. The secondary compression characteristics of the surficial peat and clay would tend to increase total and differential settlements and would require considerable maintenance through the years. Therefore, we recommend that the floor slab be designed as a structural slab supported by piles.

6. Pile Installation

Piles should be driven to achieve an embedment length or a minimum tip elevation. If a final blow count from a dynamic driving formula is required by a local building code, the piles should be allowed to "set up" for twelve to twenty-four hours. Once this is done, the required blow count may be demonstrated by redriving the pile for a short length.

C. Gas Collection System

To relieve methane gas buildup beneath the slab, a gas collection and outlet system is advisable. This system could be constructed in the gravel layer immediately under the lowest floor slab.

We appreciate this opportunity of serving you. If you have any questions regarding this report, please feel free to call.

Respectfully submitted,

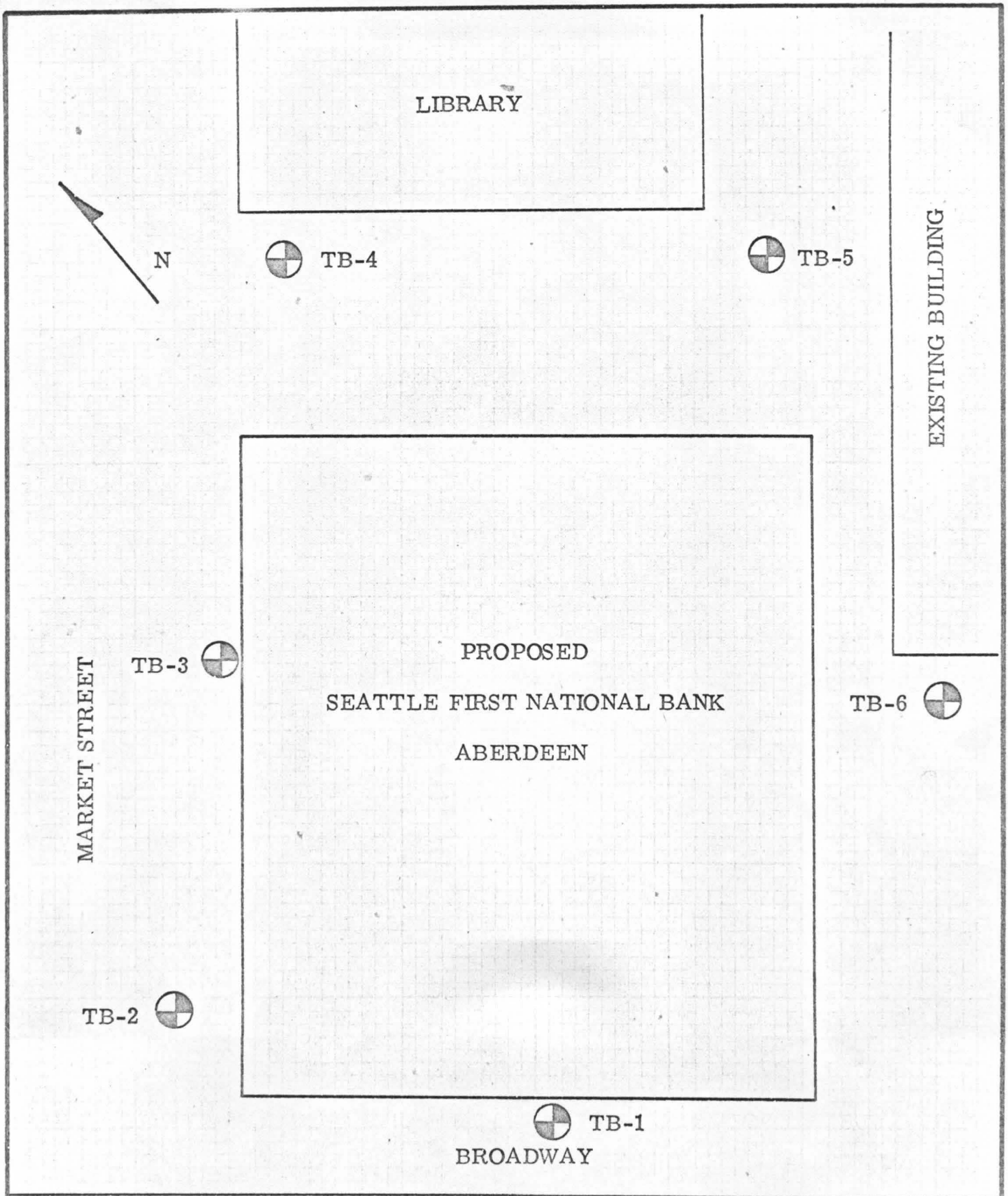
GEOLABS-WASHINGTON, INC.

ALVIN R. ZEMAN
STATE OF WASHINGTON
REGISTERED
PROFESSIONAL ENGINEER

Dean E. Ryden

Alvin R. Zeman, P.E.

DER/mh

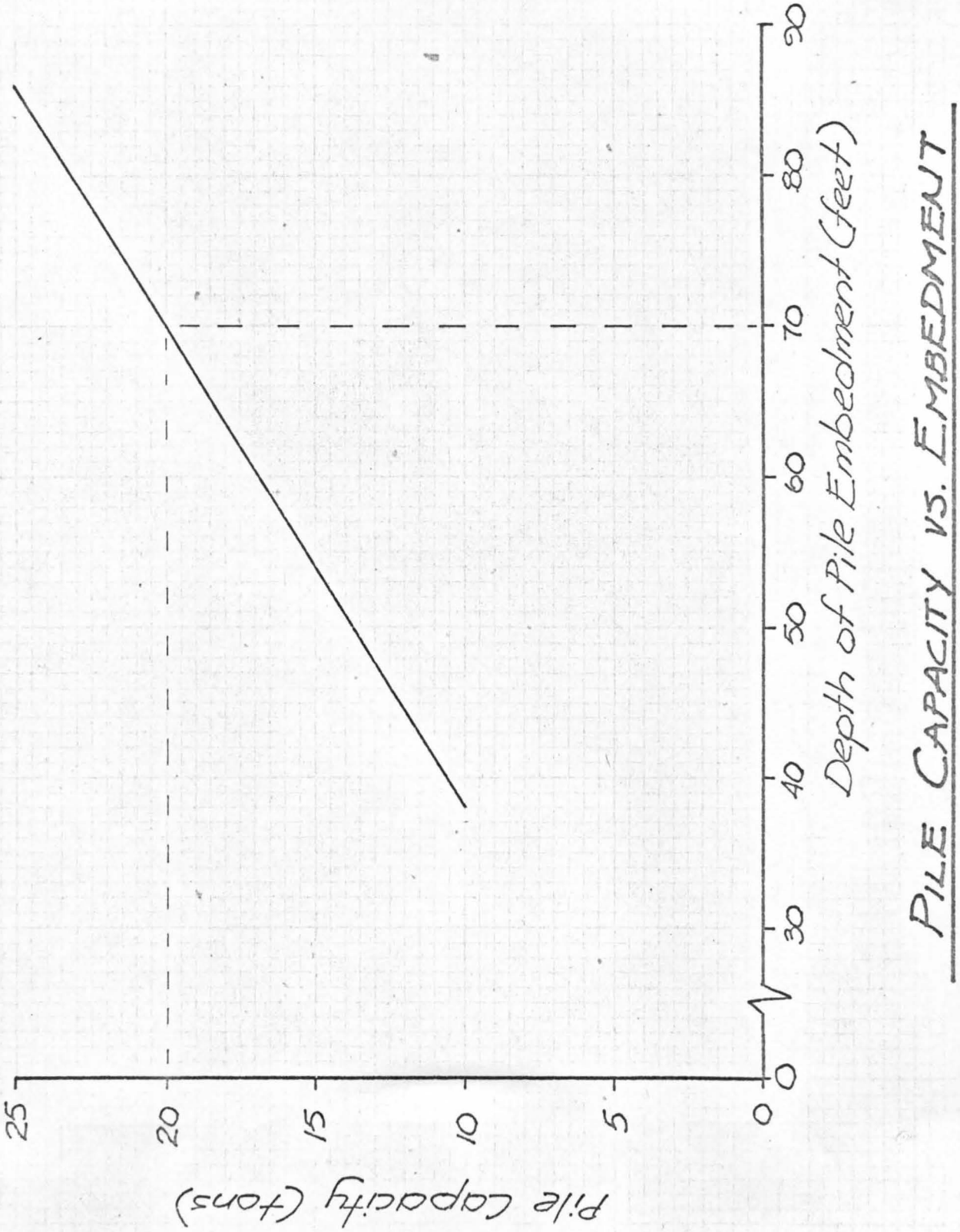


Approximate Test Boring Locations

GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING

DATE 9-28-72 BY D.A.
SCALE 1" = 30' W.O. 896-40

PLATE 1



PILE CAPACITY VS. EMBEDMENT

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GEOLOGY AND SOIL ENGINEERING

DATE Oct. 1972 BY DER
SCALE — W.O. 836-40

PLATE 2

APPENDIX A

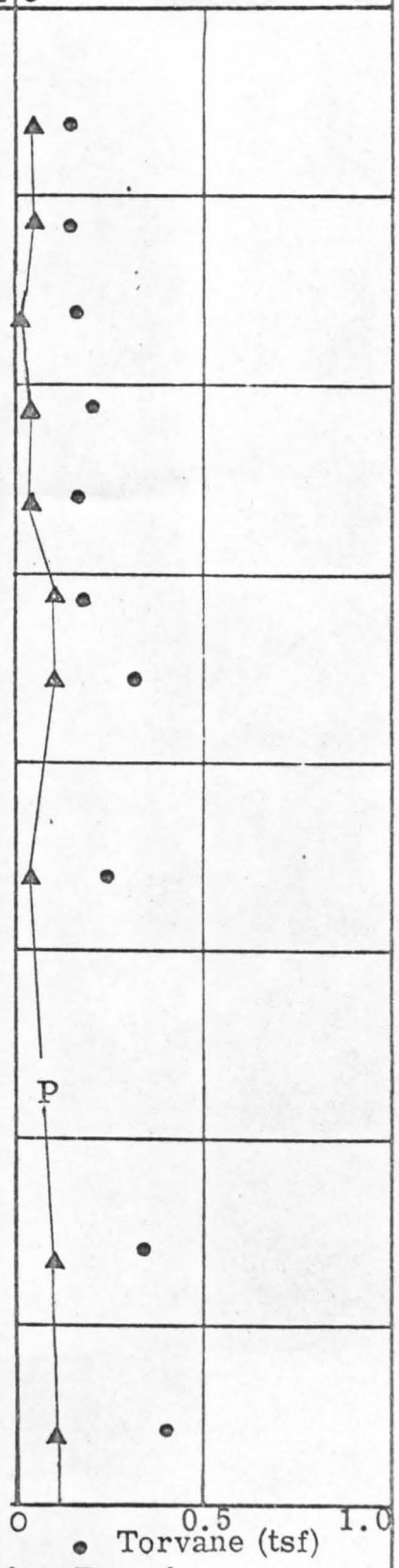
LOGS OF BORING

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation
		Soft, tan, silty CLAY. (Fill)
		Loose, green, silty SAND.
5		PEAT.
		Soft, tan, peaty, silty CLAY.
10		
		Soft, gray, sandy, silty CLAY with mica flakes.
15		
20		
25		
30		Very loose to loose, gray, silty SAND. In-place vane shear @ 31 ft. = 0.78 tsf.
35		
40		

SAMPLES

DEPTH, feet

STANDARD PENETRATION RESISTANCE (140 lb. weight, 30" drop)
▲ Blows per foot



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

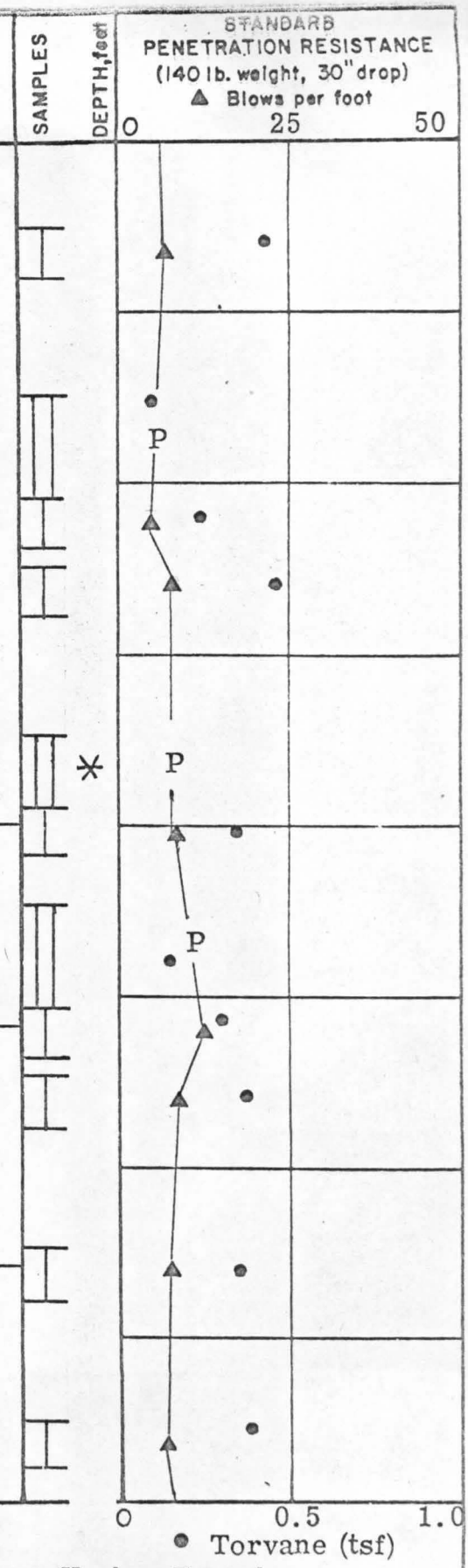
Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank

LOG OF BORING NO. B-1
Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation
		Very loose to loose, gray, silty SAND.
45		
50		
55		
60		Soft, gray, sandy, silty CLAY.
65		
		Medium dense, gray, silty SAND.
70		
75		Medium stiff to stiff, gray, sandy, silty CLAY.
80		



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- * Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank

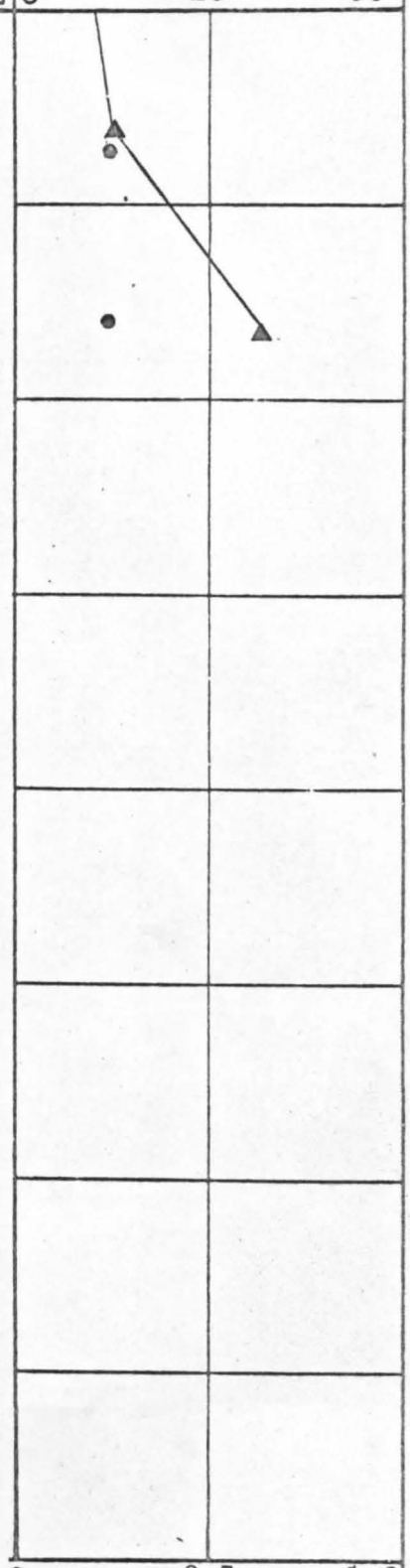
LOG OF BORING NO. B-1 (cont.)

Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation	SAMPLES	DEPTH, feet
		Medium stiff to stiff, gray, sandy, silty CLAY.		
85				
		Medium dense, gray, fine to medium SAND with silt lenses.		
90				
		Bottom of hole 89 ft.		
		Methane gas bubbling up in test hole.		

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



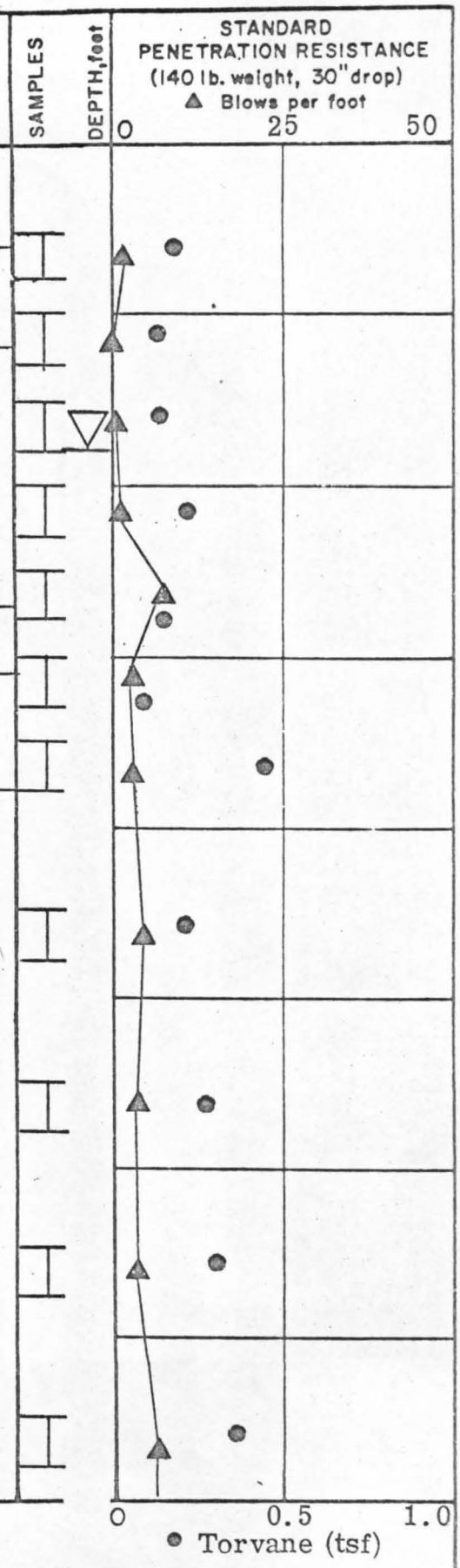
LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-1 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation
		Very soft, tan, sandy, silty CLAY.
5		PEAT.
10		Soft, gray, silty CLAY with organic debris.
15		Loose, gray, coarse SAND with gravel.
		Loose, gray SAND with occasional wood chips.
20		Soft, gray, sandy, silty CLAY. In-place vane shear @ 22 ft. = 0.53 tsf.
25		
30		
35		
40		



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

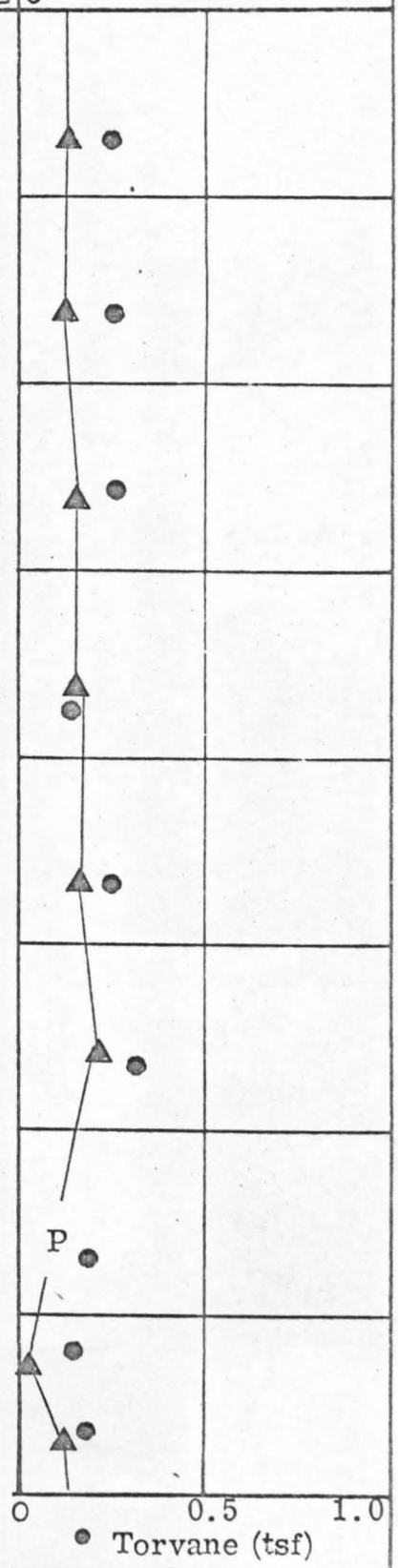
Grays Harbor Branch
Seattle First National Bank

LOG OF BORING NO. B-2

Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation	SAMPLES	DEPTH, feet
		Soft, gray, sandy, silty CLAY.		
45				
50				
55				
60				
65		Coarse SAND and gravel at 67 ft.		
70				
75				
80				



LEGEND

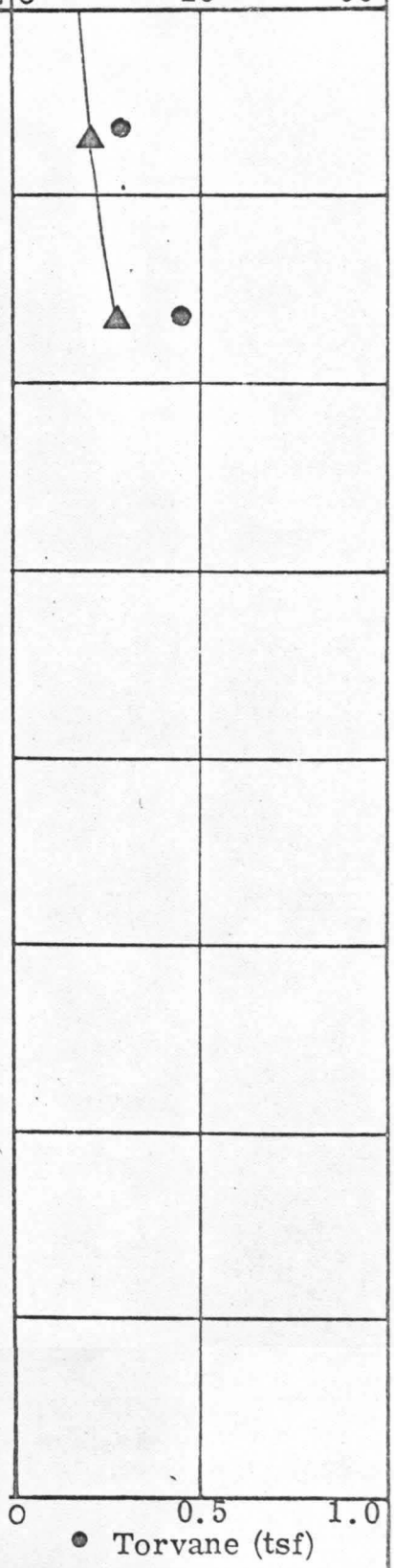
- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-2 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation	SAMPLES	DEPTH, feet
		Soft, gray, sandy, silty CLAY.		
85				
		Stiff, tan SILT with organics.		
90		Bottom of hole 89 ft. Methane gas bubbling up in test hole.		

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



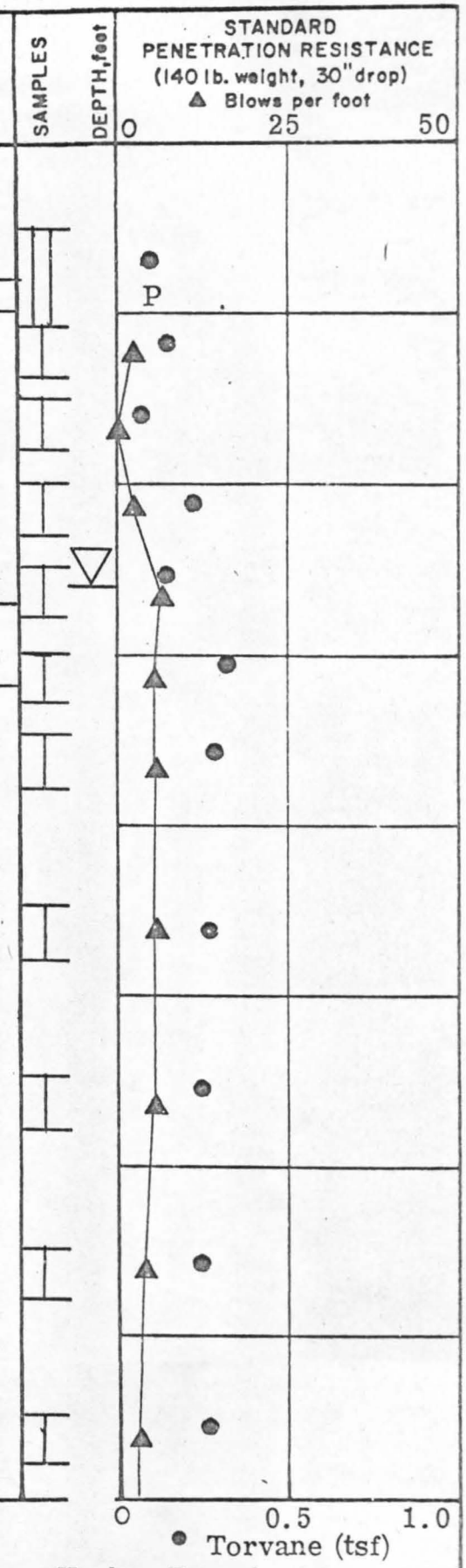
LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Afterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-2 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation
		Loose, tan to gray, silty, fine SAND.
5		PEAT.
		Soft, gray, sandy, silty CLAY with organic debris (root fibers and sawdust).
10		
15		Loose, gray, coarse SAND with gravel.
		Soft, gray, sandy, silty CLAY with fine sand lenses.
20		
25		
30		
35		
40		



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- ✱ Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

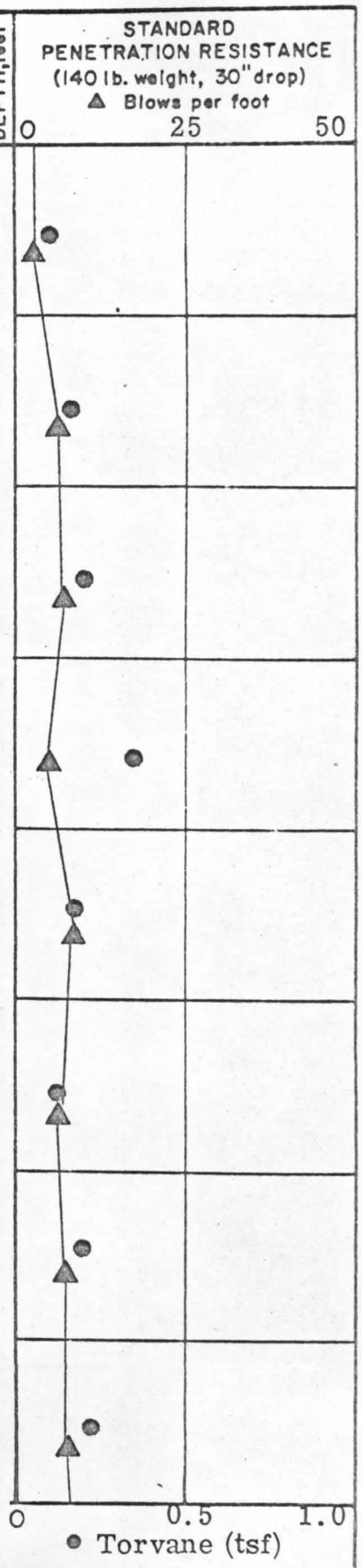
Grays Harbor Branch
Seattle First National Bank

LOG OF BORING NO. B-3

Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation	SAMPLES	DEPTH, feet
45		Soft, gray, sandy, silty CLAY with sand lens. Shell fragments were found sporadically.		
50				
55				
60		Lens of coarse, gravelly SAND at 62 ft.		
65				
70				
75				
80				



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- * Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

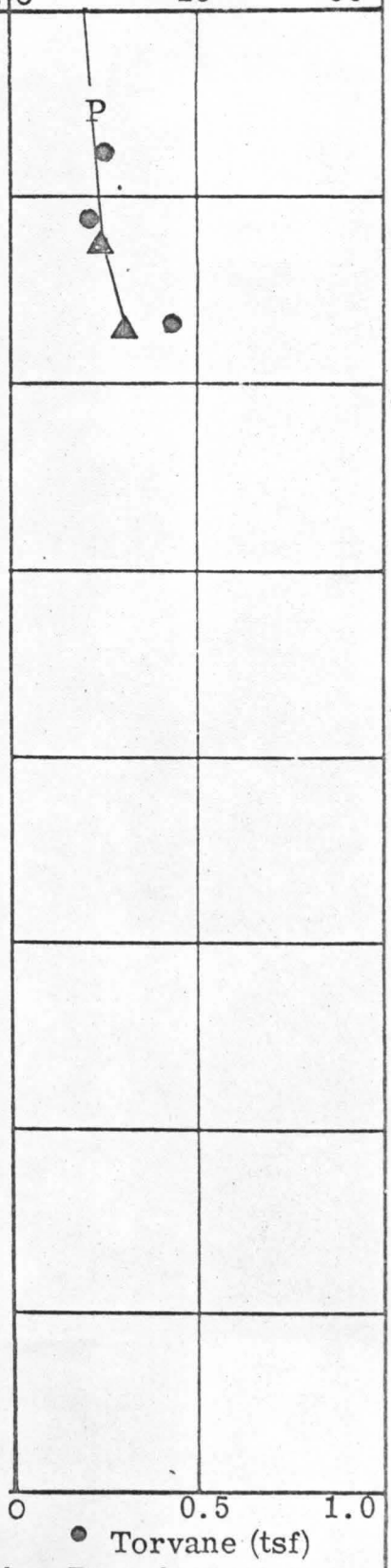
Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-3 (cont.)
Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Sidewalk Elevation	SAMPLES	DEPTH, feet
		Soft, gray, sandy SILT.		
85				
		Tan, silty CLAY with minor amounts of peat fragments.		
90		Bottom of hole 89 ft. Methane gas bubbling up in test hole.		

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



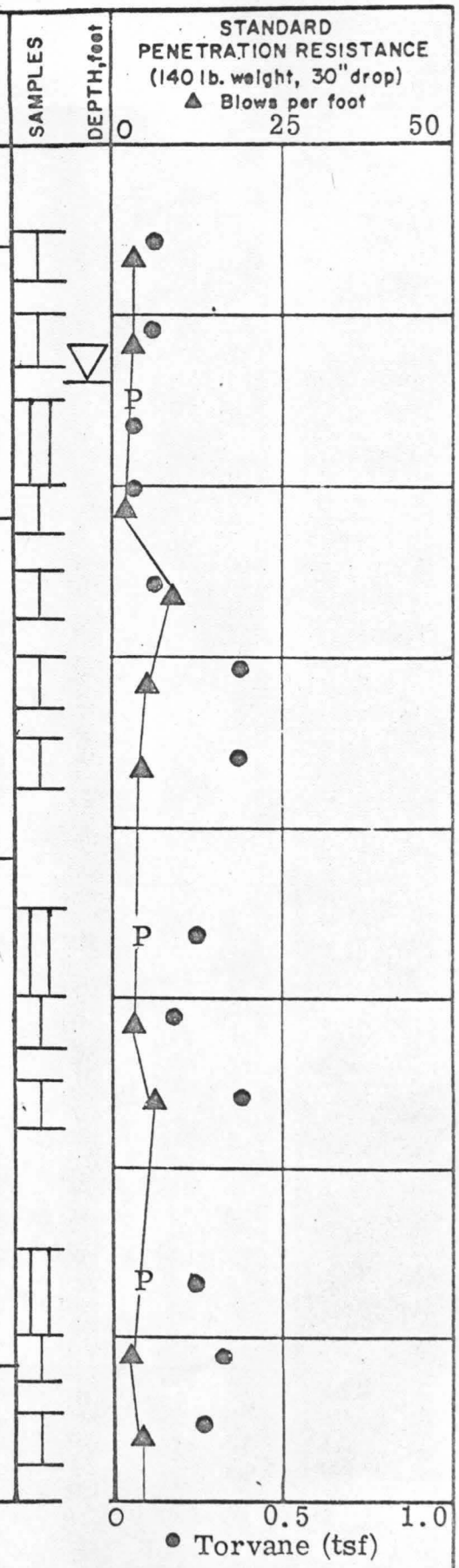
LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-3 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation
		Soft, tan, sandy SILT with organic peat and sawdust.
5		Soft, gray, silty CLAY and peat.
10		
		Loose, gray SAND with silt and peat.
15		
20		
		Soft, gray, sandy, silty CLAY with some peat.
25		
30		
35		
		Soft, gray, sandy, silty CLAY with thin sand lenses.
40		



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-4
Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation	SAMPLES	DEPTH, feet	STANDARD PENETRATION RESISTANCE (140 lb. weight, 30" drop) ▲ Blows per foot 0 25 50
		Soft, gray, sandy, silty CLAY with thin sand lenses.			
45					
50					P
55					
60					P
65					
70					
75					
80					0 0.5 1.0 ● Torvane (tsf)

LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Atterberg limits: Liquid limit; Natural water content; Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Grays Harbor Branch
Seattle First National Bank

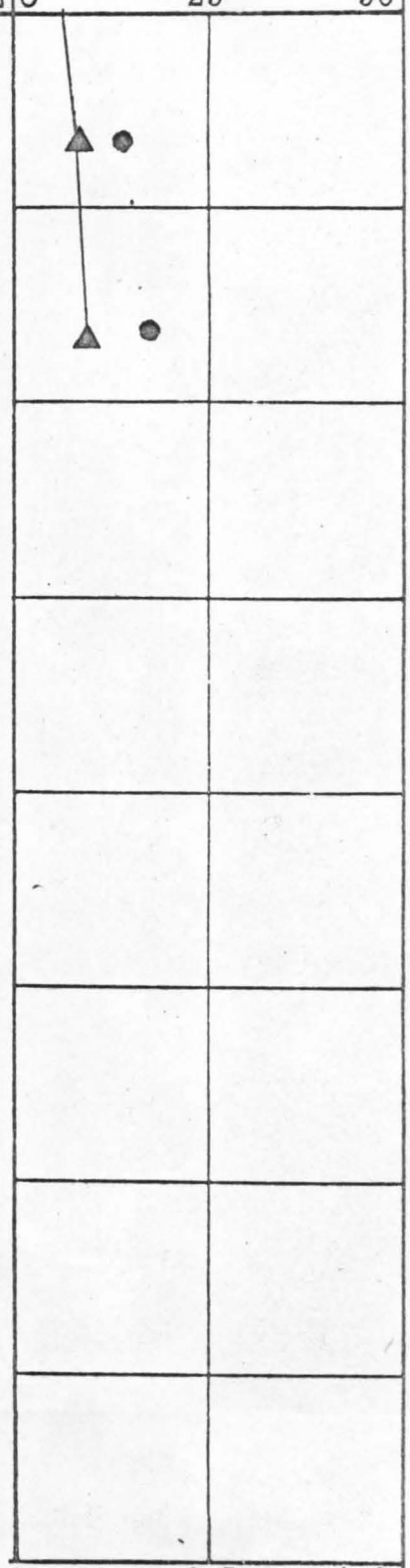
LOG OF BORING NO. B-4 (cont.)

Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation	SAMPLES	DEPTH, feet
		Soft, gray, sandy, silty CLAY with thin sand lenses.		
85				
		Soft, tan, silty CLAY with wood fragments.		
90				
		Bottom of hole 91 ft.		
95				

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



● Torvane (tsf)

LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- ✱ Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

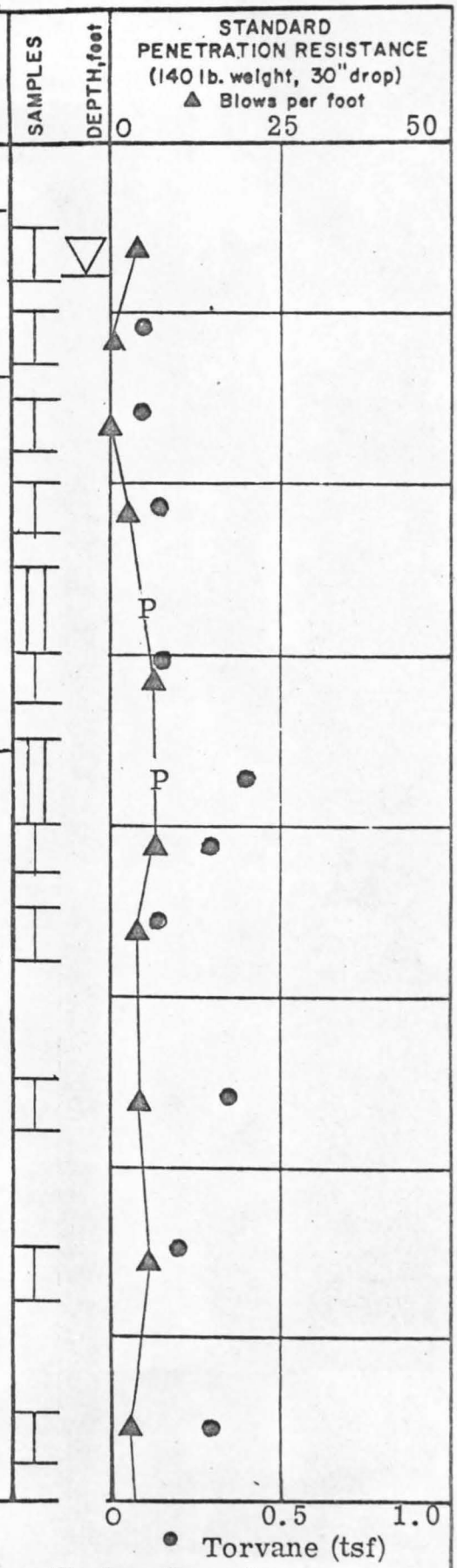
Grays Harbor Branch
Seattle First National Bank

LOG OF BORING NO. B-4 (cont.)

Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation
		Very soft, brown, sandy SILT.
5		Very soft, brown PEAT and brown, wet CLAY.
10 15		Very soft, gray, sandy CLAY with lenses of peat and wood fragments.
20 25 30 35 40		Soft, gray, sandy, silty CLAY.



LEGEND

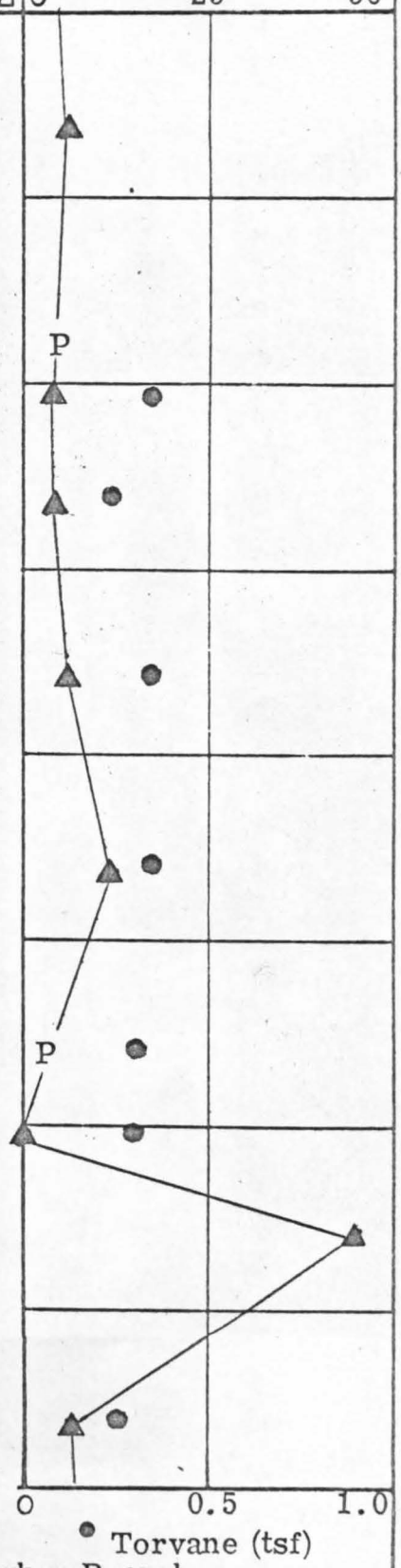
- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-5
Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation
		Soft, gray, sandy SILT.
45		Loose, gray, fine SAND with thin beds of gray, sandy silt and some wood fragments.
50		
55		
60		Soft, gray, sandy, clayey SILT with beds of fine sand and some organics.
65		
70		
		Dense, gray, silty, clayey, sandy GRAVEL.
75		
		Soft to stiff, sandy, silty CLAY with scattered peat fragments and thin beds of fine sand.
80		



LEGEND

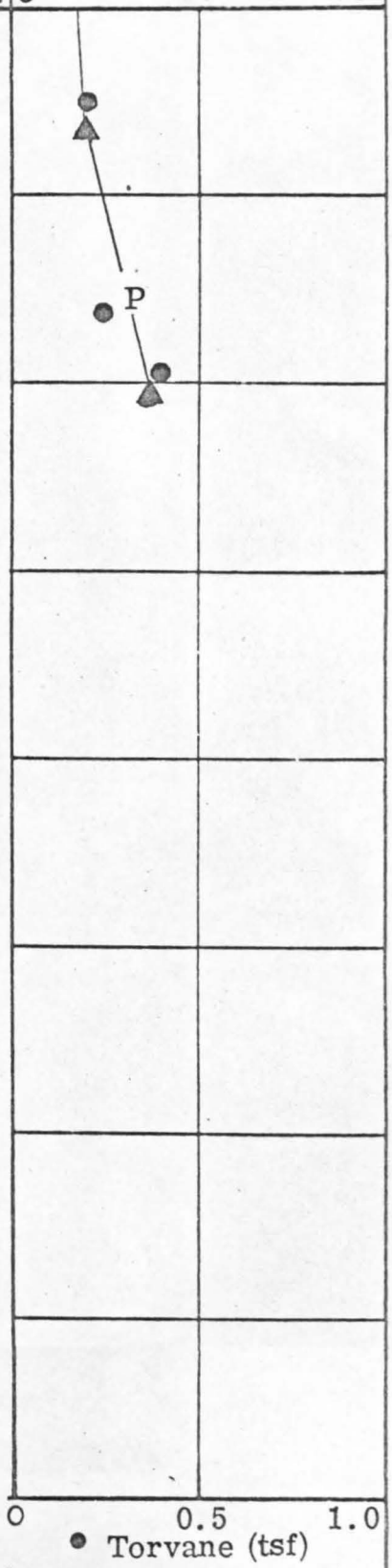
- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-5 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation	SAMPLES	DEPTH, feet
		Soft to stiff, sandy, silty CLAY with scattered peat fragments and thin beds of fine sand.		
85				
90				
		Bottom of hole 91 ft.		
95				

STANDARD PENETRATION RESISTANCE (140 lb. weight, 30" drop)
▲ Blows per foot



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- ✱ Sample not recovered

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

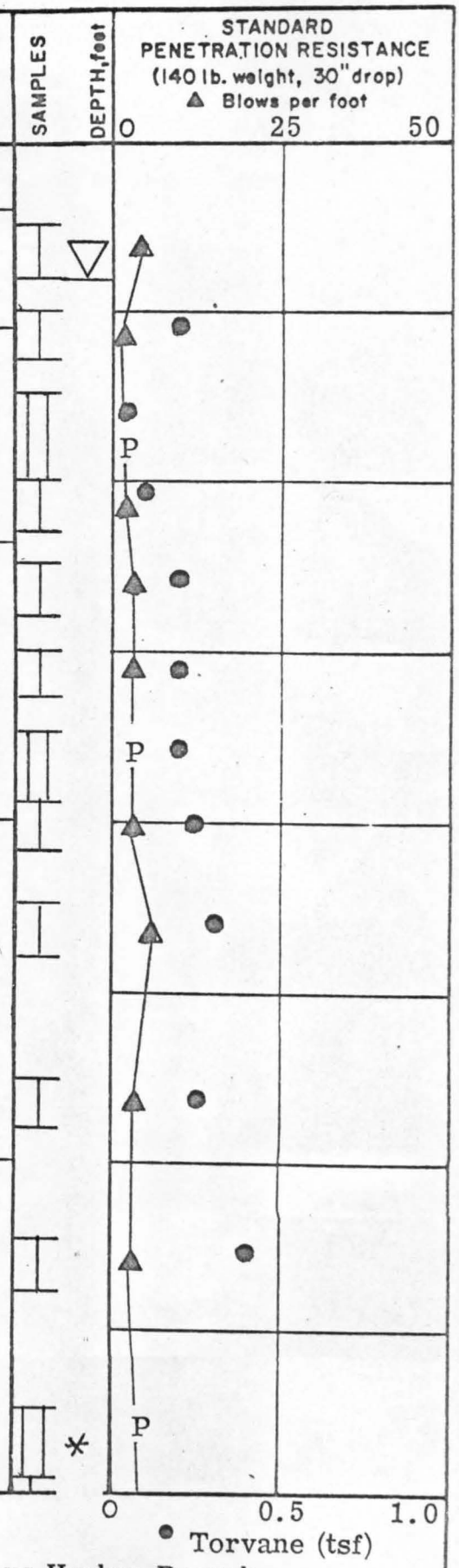
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Grays Harbor Branch
Seattle First National Bank

LOG OF BORING NO. B-5 (cont.)
Sept. 1972 W-896-40

GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation
		Very loose, brown, silty, gravelly SAND.
5		Compressed sawdust and peat.
10		Soft, gray CLAY and peat with thin localized sand zones.
15		Soft, gray CLAY with thin zones of peat and thin lenses of silty fine sand.
20		Soft, gray, sandy SILT.
25		
30		Very soft to soft, gray, sandy, silty CLAY with thin beds of silty fine sand.
35		
40		



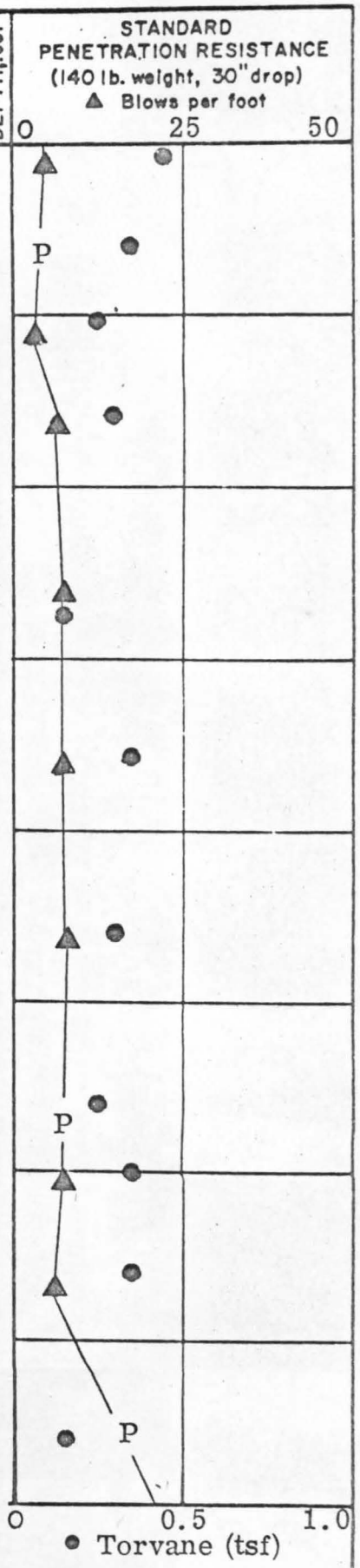
LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- * Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-6
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation	SAMPLES	DEPTH, feet
		Very soft to soft, gray, sandy, silty CLAY with thin beds of silty, fine sand.		
45		Wood fragments at 48 ft.		
50				
55				
60				
65				
70				
75				
80				



LEGEND

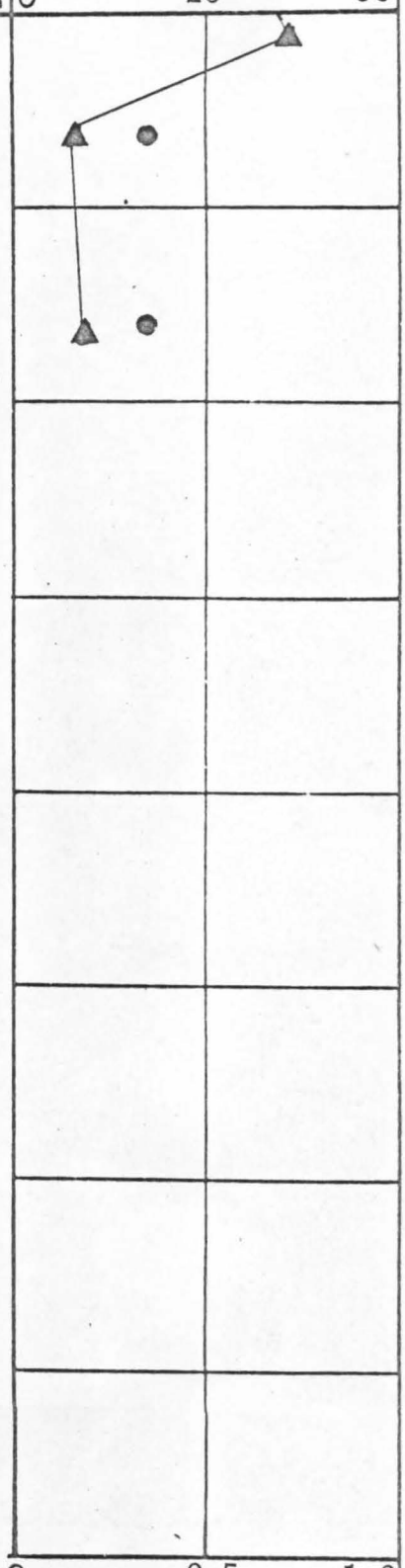
- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- * Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-6 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

DEPTH, feet	USC	SOIL DESCRIPTION Surface Elevation: Parking Lot Elevation	SAMPLES	DEPTH, feet
		Dense, green, silty, sandy GRAVEL.		
85		Medium stiff to stiff, gray, silty CLAY with thin lenses of fine sand and some peat.		
90		Bottom of hole 89 ft. Methane gas bubbling up in test hole.		

STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot



LEGEND

- 2.0" O.D. split spoon sample
- 3.0" O.D. thin-wall sample
- Sample not recovered
- Impervious seal
- Water level
- Piezometer tip
- P Sampler pushed
- USC Unified Soil Classification

Atterberg limits:
- Liquid limit
- Natural water content
- Plastic limit

Grays Harbor Branch
Seattle First National Bank
LOG OF BORING NO. B-6 (cont.)
Sept. 1972 W-896-40
GEOLABS, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

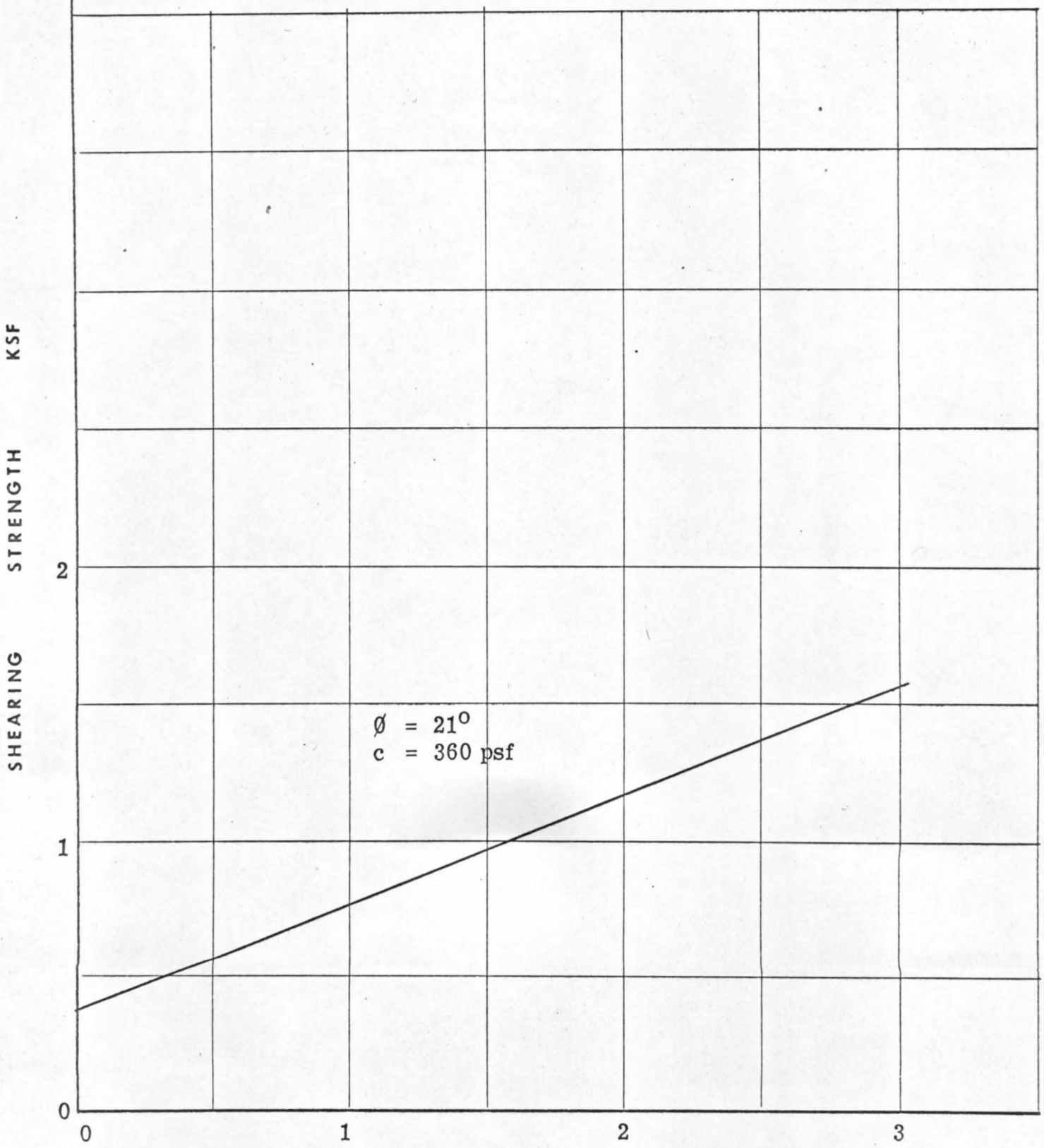
APPENDIX B

LABORATORY TESTING RESULTS

NATURAL DENSITY AND MOISTURE CONTENT

Depth	Boring No.	Sample No.	Natural Density (pcf)	Moisture Content (%)	Description
2.5 - 5.0	3	1	114.5	37.5	silty, fine SAND
7.5 - 9.5	6	3	76.5	166.4	CLAY with peat
12.5 - 15.0	5	5	95.5	66.6	sandy CLAY with peat
17.5 - 19.5	6	7	97.3	63.5	sandy CLAY with peat zones
27.5 - 30.0	1	9	86.3	84.0	sandy, silty CLAY
32.5 - 35.0	4	11	98.0	63.6	sandy, silty CLAY with some peat
47.5 - 50.0	1	13	101.0	52.1	silty SAND
52.5 - 55.0	4	16	114.0	35.7	silty CLAY with sand lenses
62.5 - 64.5	4	19	97.1	56.3	sandy, silty CLAY
73.5 - 75.5	2	19	103.6	57.3	sandy, silty CLAY

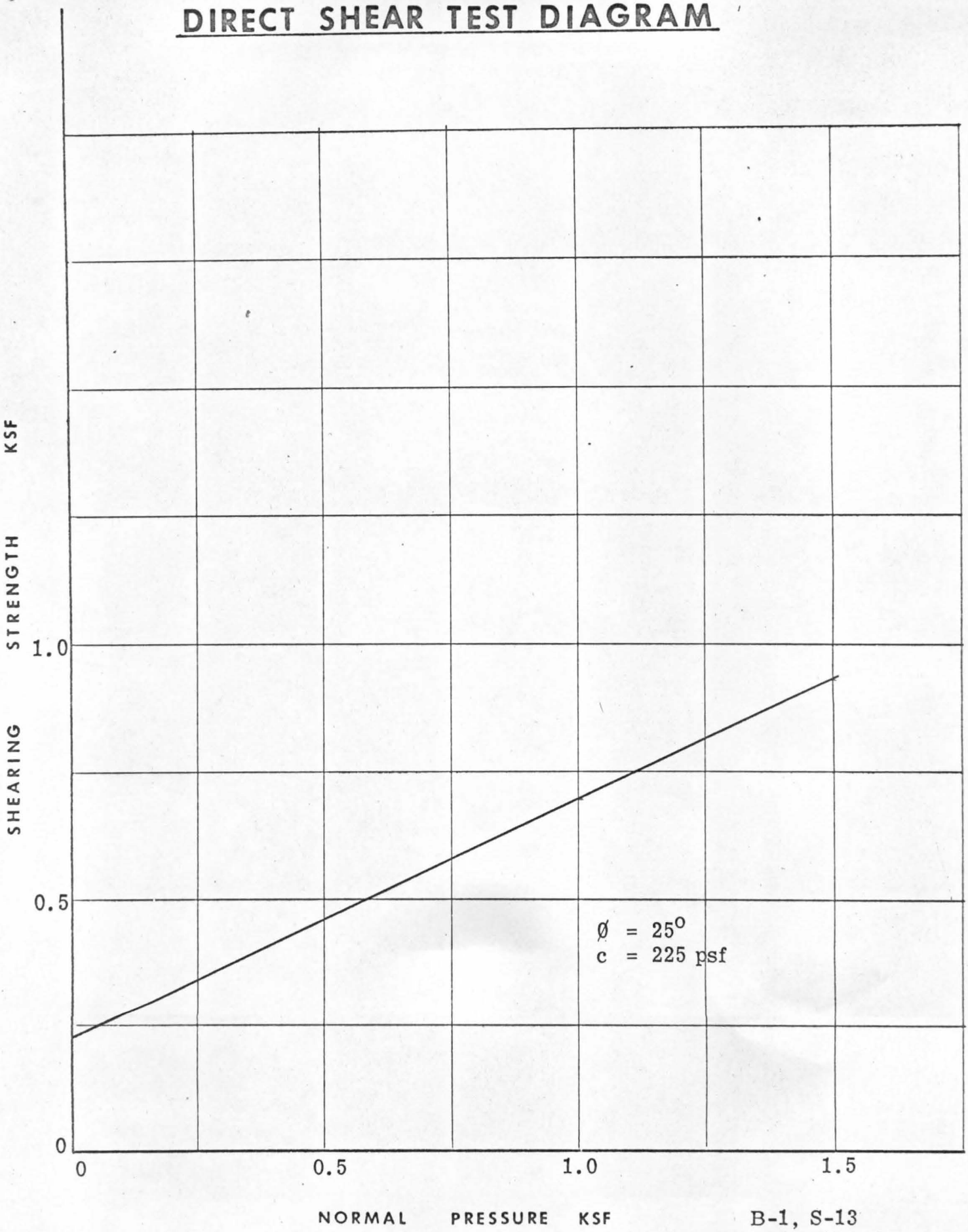
DIRECT SHEAR TEST DIAGRAM



B-1, S-9
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

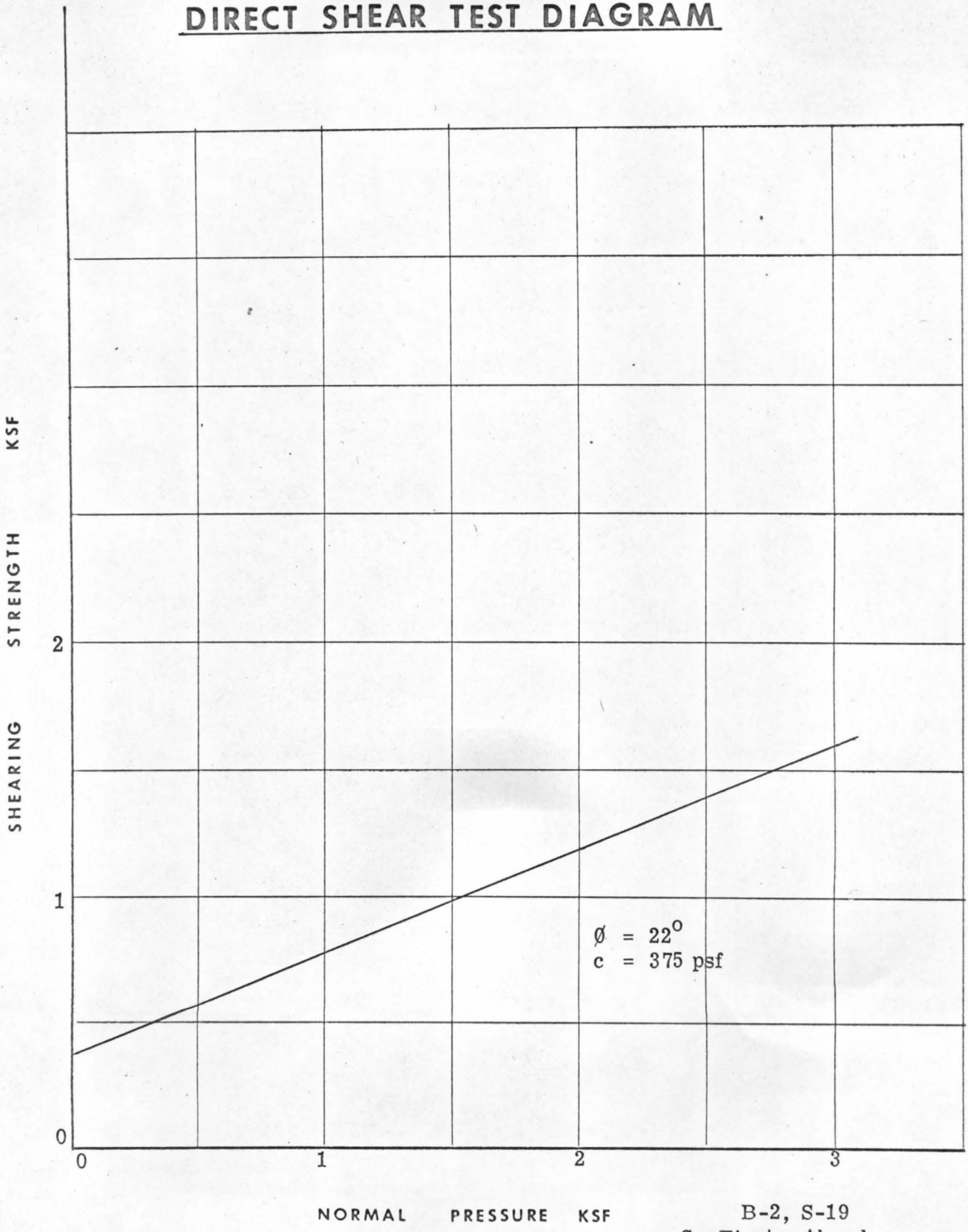
DIRECT SHEAR TEST DIAGRAM



B-1, S-13
Sea First - Aberdeen
W-896-40

GEOLABS, INC.

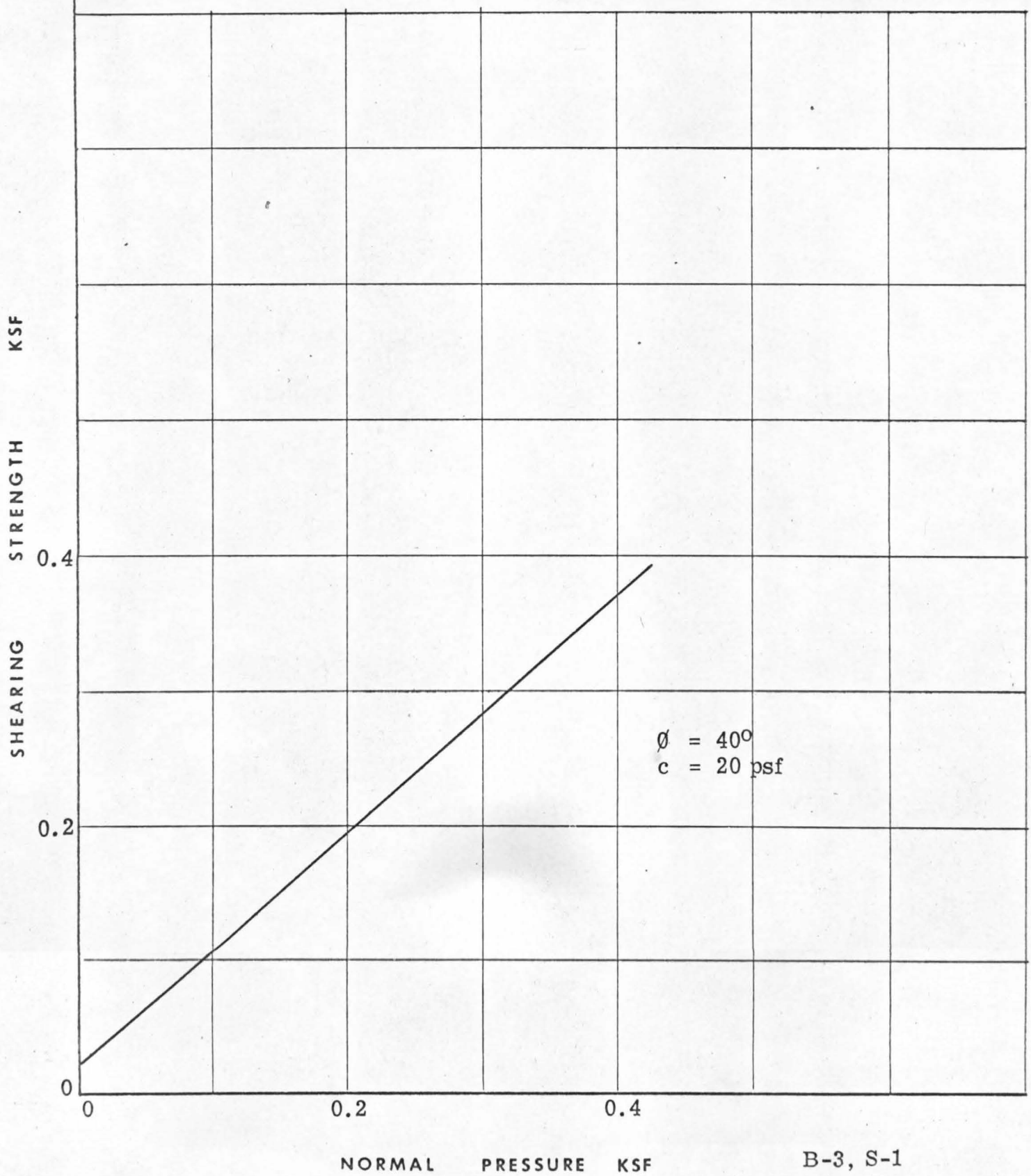
DIRECT SHEAR TEST DIAGRAM



B-2, S-19
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

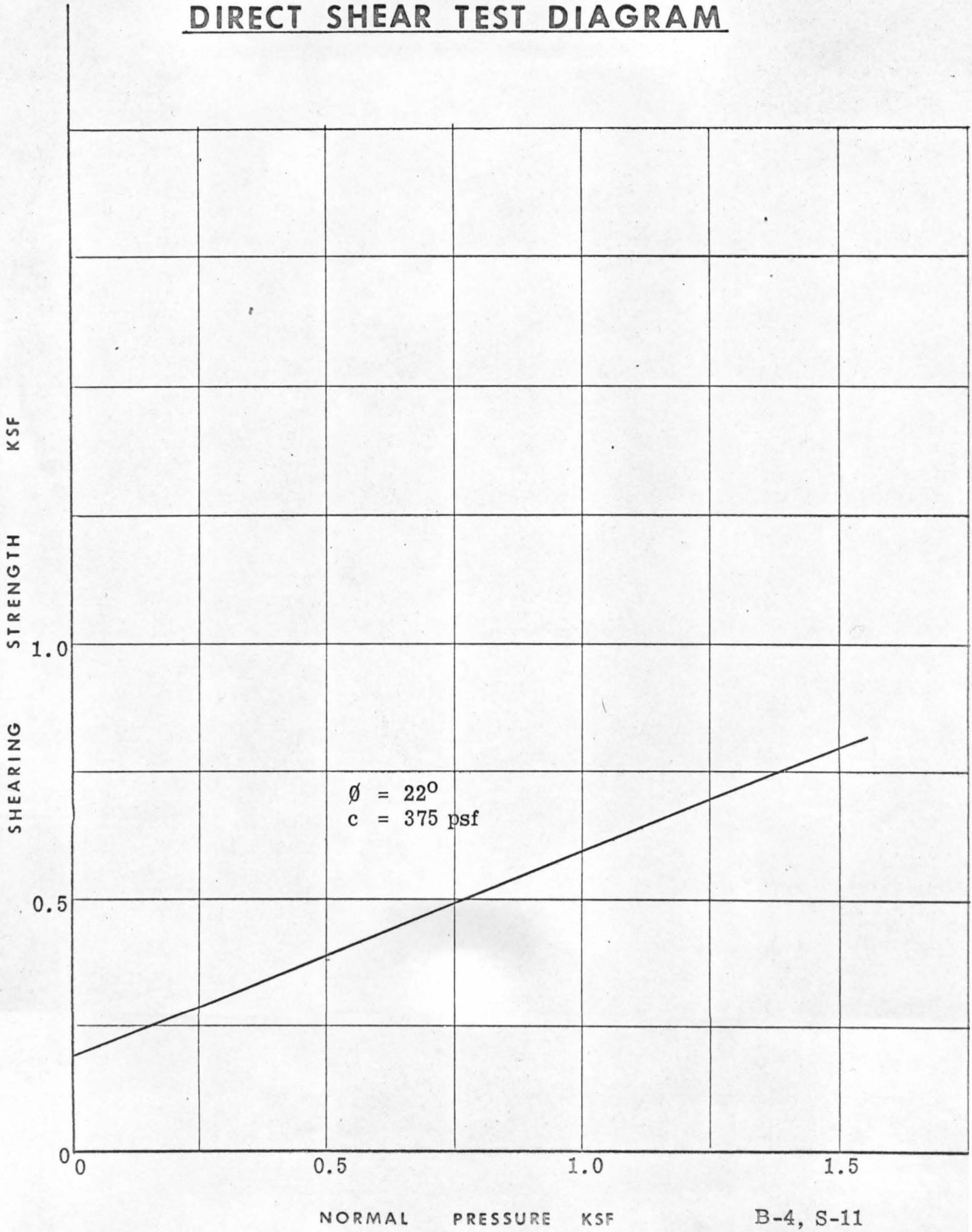
DIRECT SHEAR TEST DIAGRAM



B-3, S-1
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

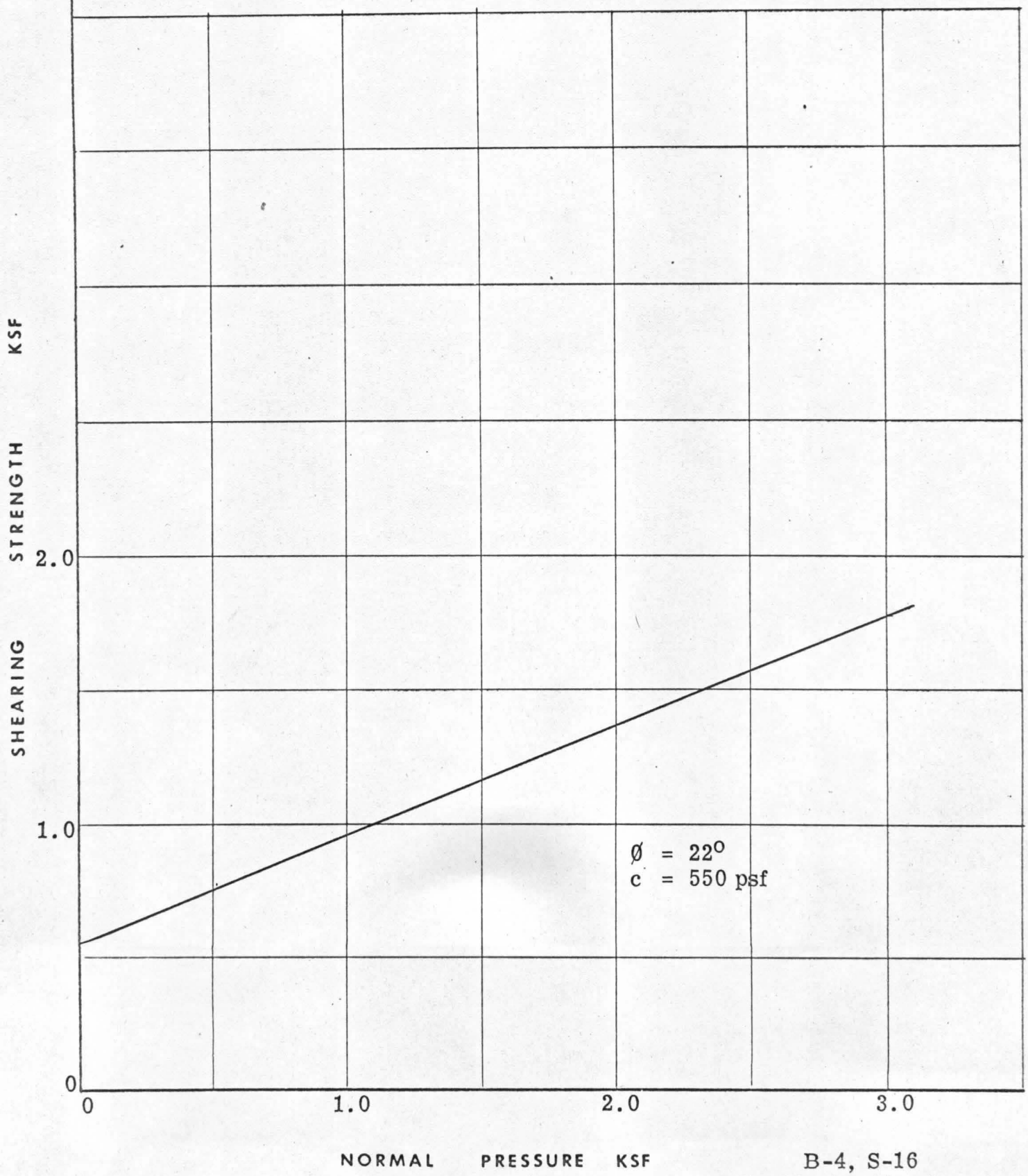
DIRECT SHEAR TEST DIAGRAM



B-4, S-11
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

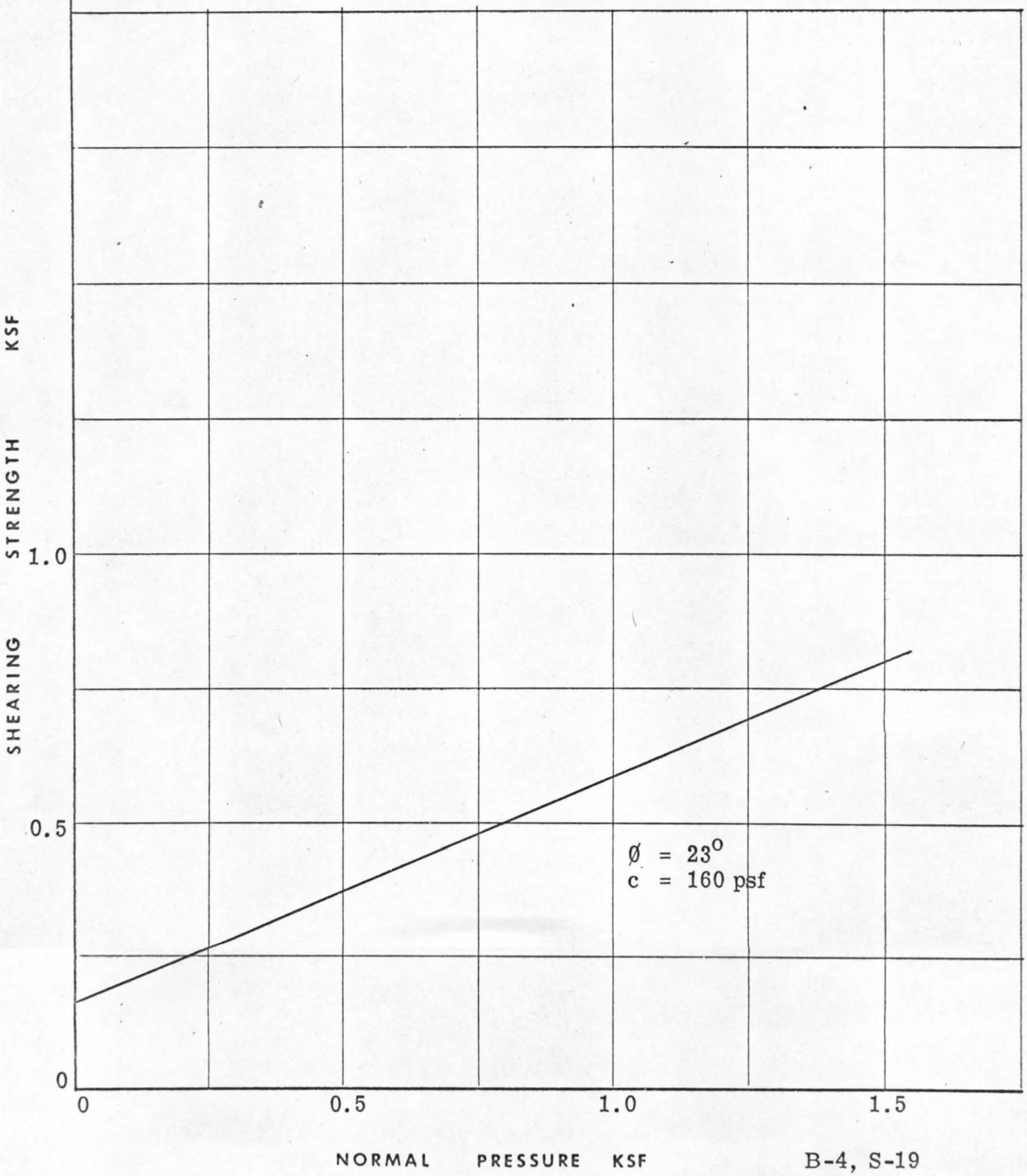
DIRECT SHEAR TEST DIAGRAM



B-4, S-16
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

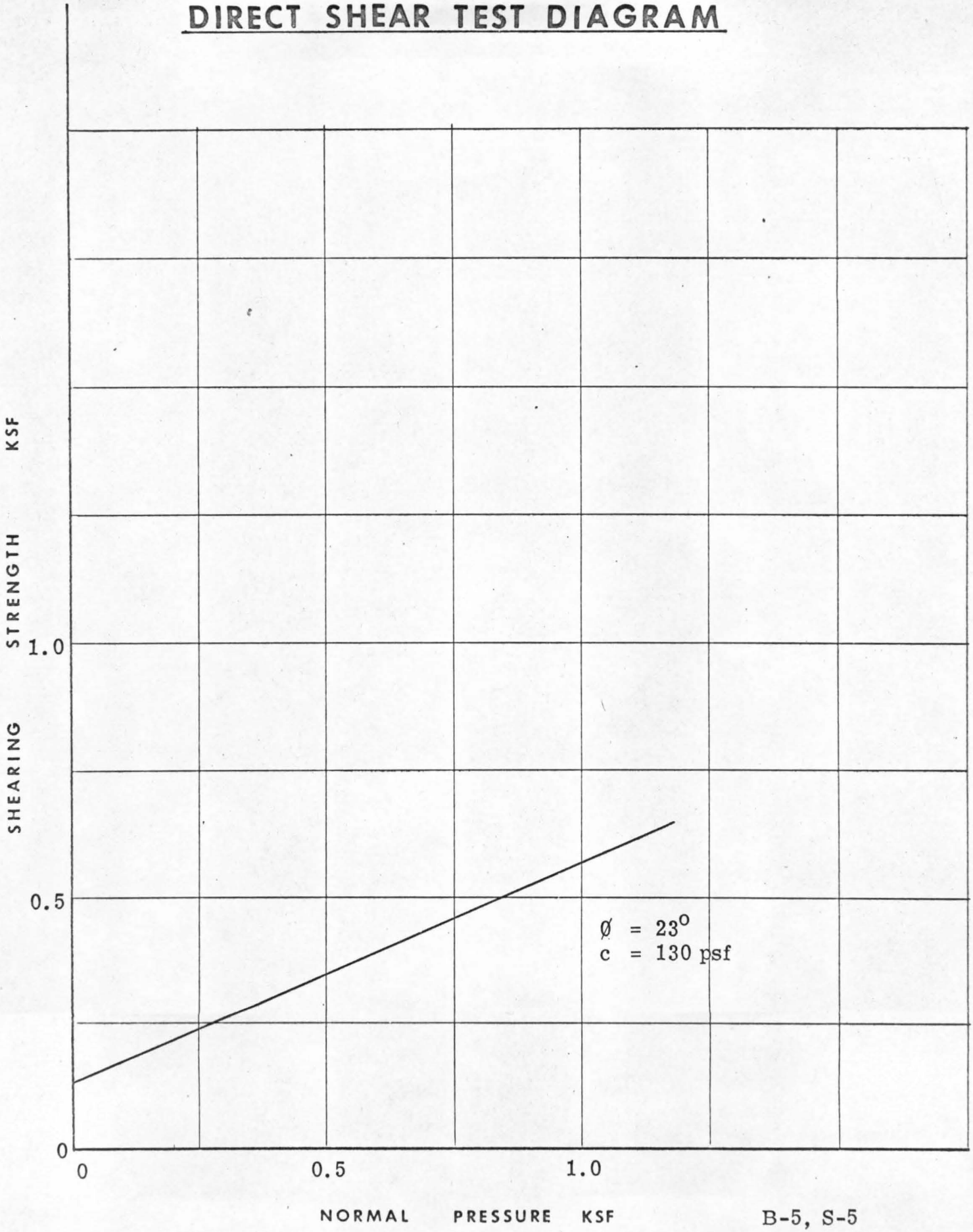
DIRECT SHEAR TEST DIAGRAM



B-4, S-19
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

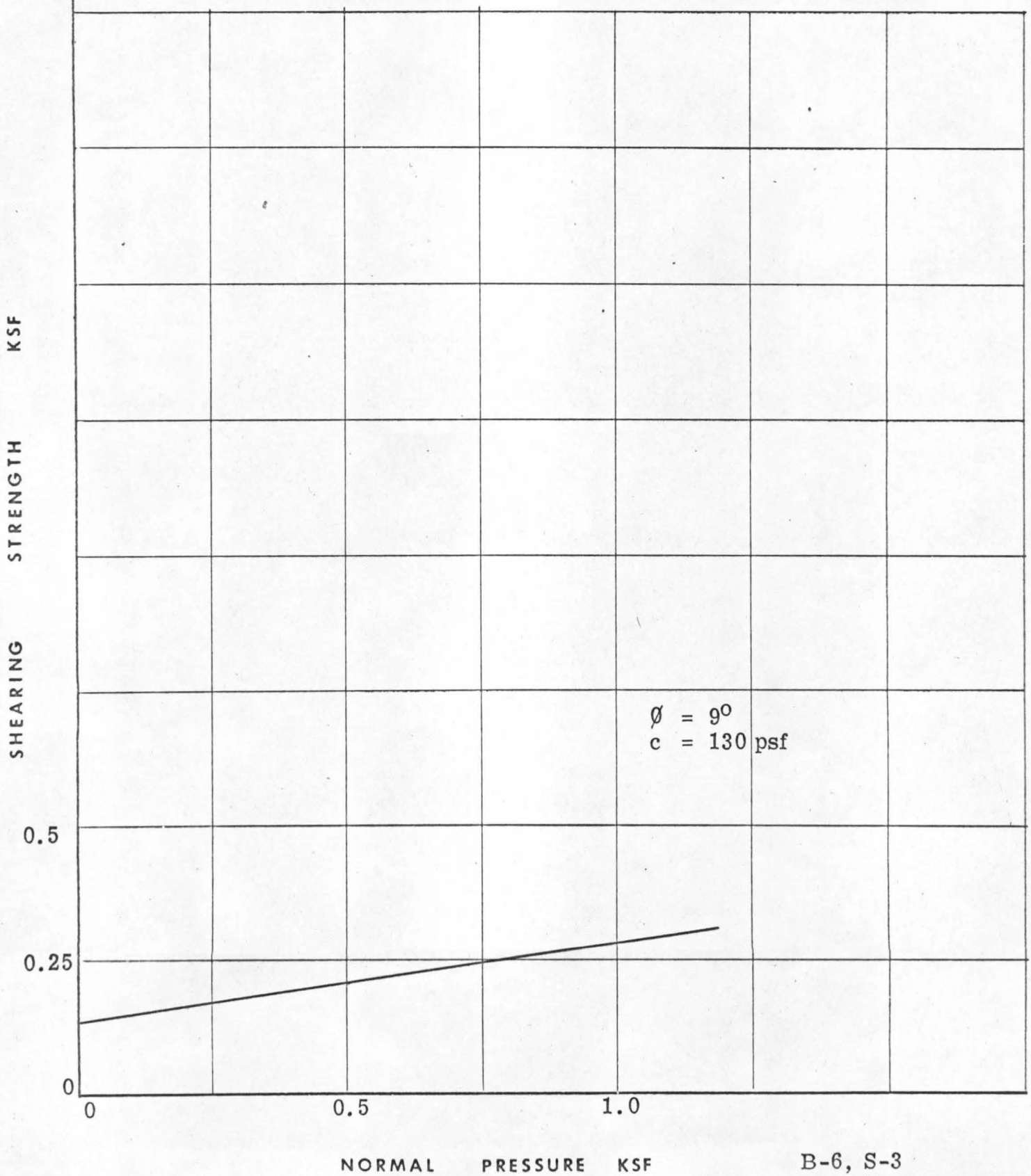
DIRECT SHEAR TEST DIAGRAM



B-5, S-5
SeaFirst - Aberdeen
W-896-40

GEOLABS, INC.

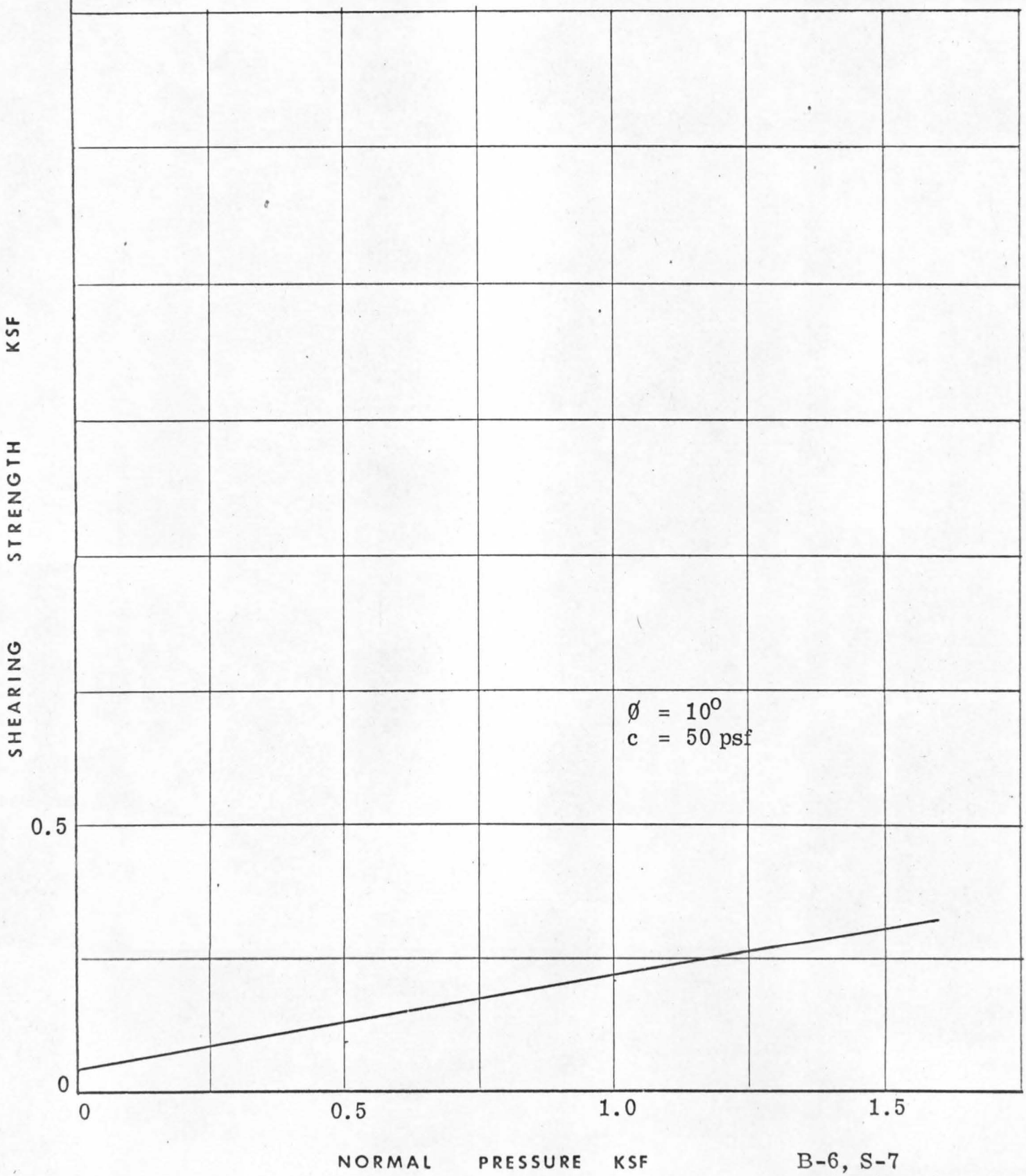
DIRECT SHEAR TEST DIAGRAM



B-6, S-3
SeaFirst - Aberdeen
W-896-40

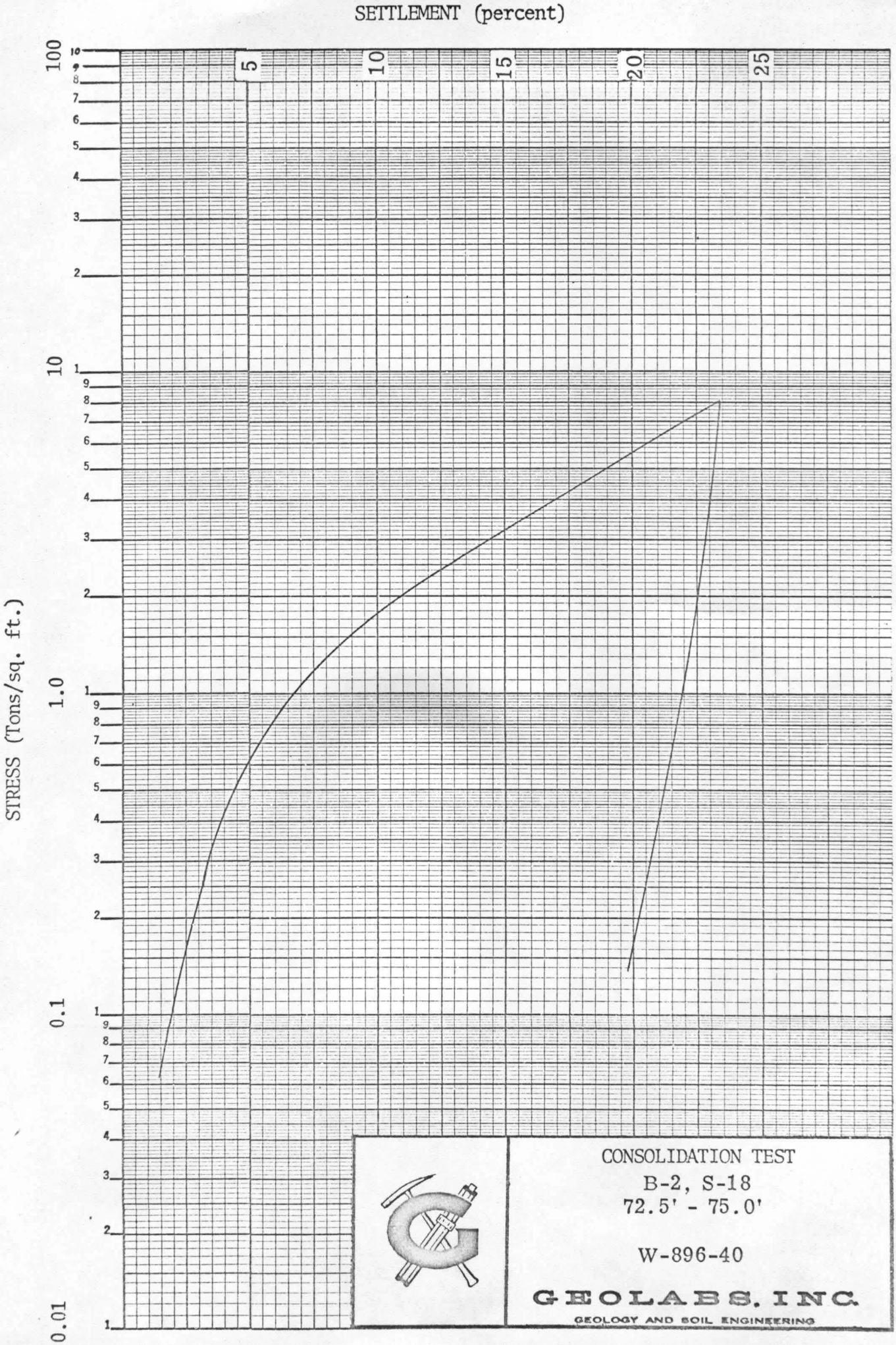
GEOLABS, INC.

DIRECT SHEAR TEST DIAGRAM



B-6, S-7
Sea First - Aberdeen
W-896-40

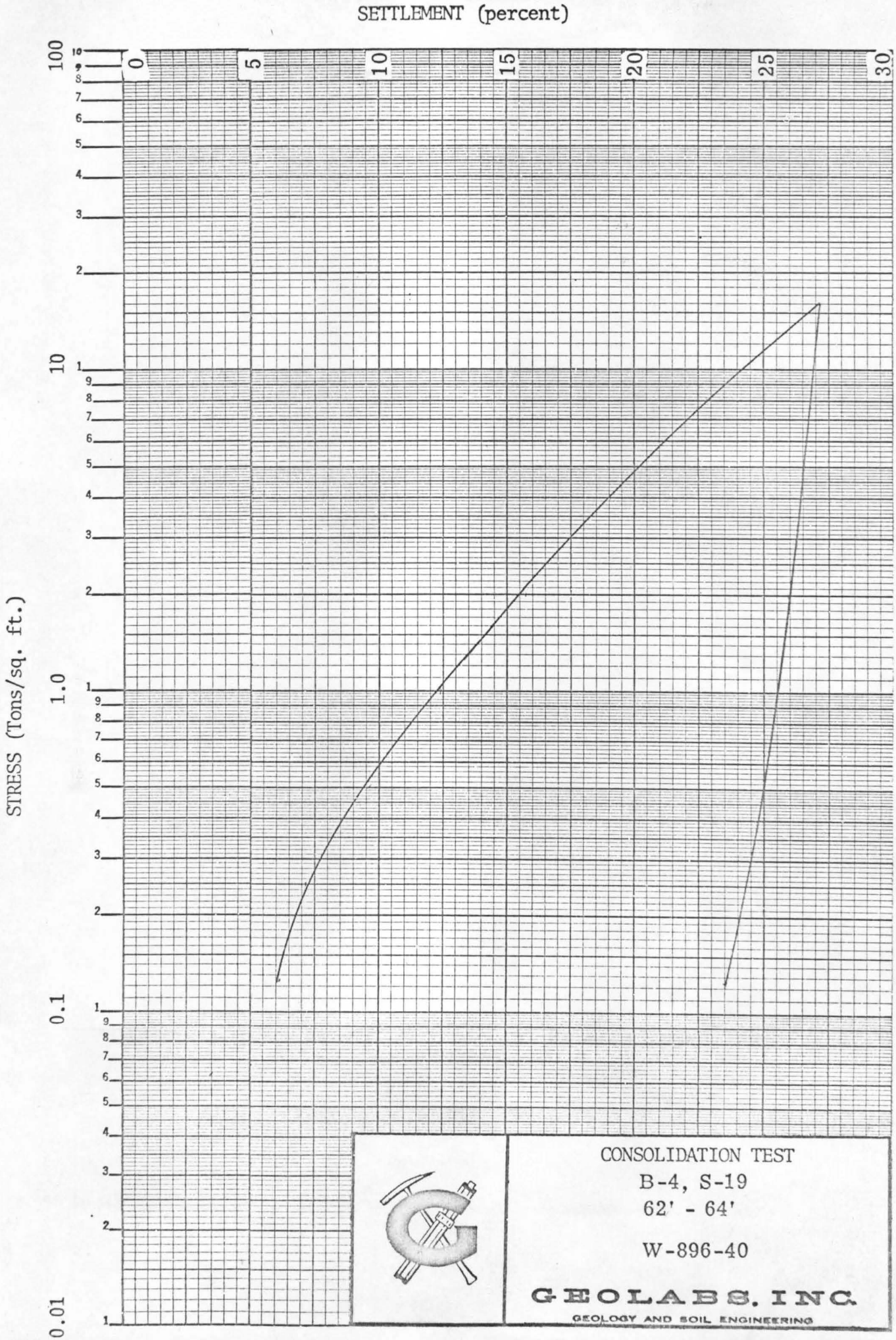
GEOLABS, INC.



CONSOLIDATION TEST
B-2, S-18
72.5' - 75.0'

W-896-40

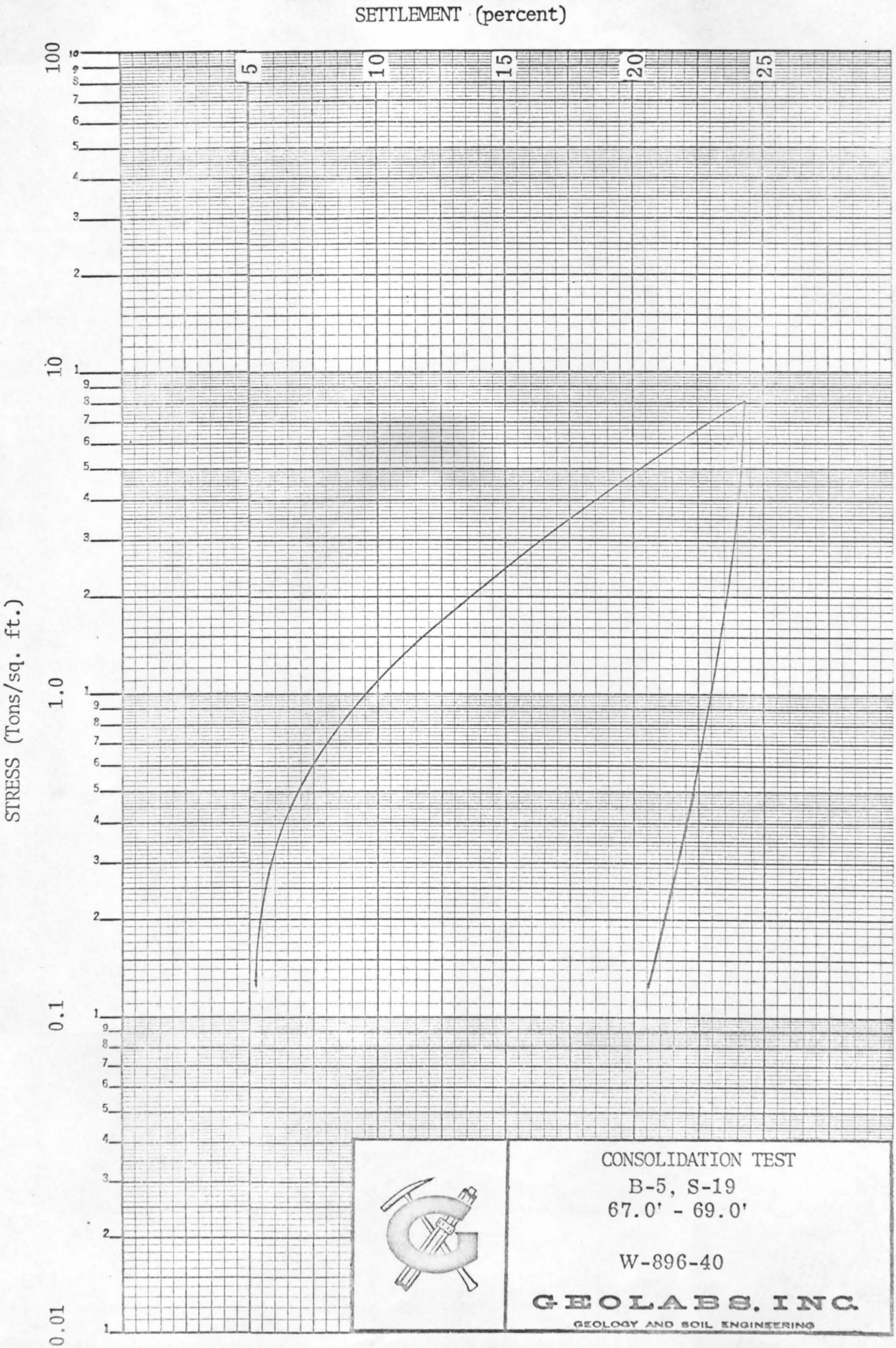
GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING



CONSOLIDATION TEST
B-4, S-19
62' - 64'

W-896-40

GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING



CONSOLIDATION TEST
B-5, S-19
67.0' - 69.0'

W-896-40

GEOLABS, INC.
GEOLOGY AND SOIL ENGINEERING