- [x] City box number Magnolia 100 (V)
- [x] Title/cover page w/the following info:
  - [x] Company (author) name
  - [x] Report Date (2nd page)
  - [x] Project name [redacted]
  - [x] Company's job number 3393
  - [ ] City DCLU project number (7-digit number)
  - [ ] City Permit number (6-digit number)
  - [ ] Kroll map index number (3-digit number, w?/E,W,N,S)
  - [ ] Green label
  - [x] Site address (may be on 1st or 2nd page of text)
- [x] Executive Summary and associated figures
- [x] Table of Contents
- [x] Project Location Plan/Map or Vicinity Map
- [x] Site Plans, Boring Location Plans, or Exploration Plans
- [ ] Survey
- [ ] Geologic Maps
- [x] Cross Sections/Subsurface Profiles
- [ ] Fill or Peat Thickness Maps and Contour Maps
- [x] Boring Logs
- [ ] Geology Text (if no logs)
- [ ] Soil Classification Key/Boring Log Key
- [ ] Probe Logs
- [ ] Test Pit Logs
- [ ] Monitoring Well Logs
- [ ] Cone Penetrometer Logs
- [ ] Shear Wave Velocity Measurements
- [ ] Groundwater Maps
- [ ] GW Elevation Tables/Data
- [ ] Soils Lab Testing (Geotechnical) Summary Tables
  - [ ] Grain Size Analyses/Hydrometer Analyses
  - [ ] Atterberg Limits
  - [ ] Strength tests: Triaxial, Unconfined, Direct Shear
  - [ ] Organic Content
  - [ ] ^{14}C or Radiocarbon Testing
  - [ ] Other_____
- [ ] Soil Chemical Analytical Testing Summary Tables
- [ ] Water/Groundwater Chemical Analytical Summary Tables
- [ ] Comments_____

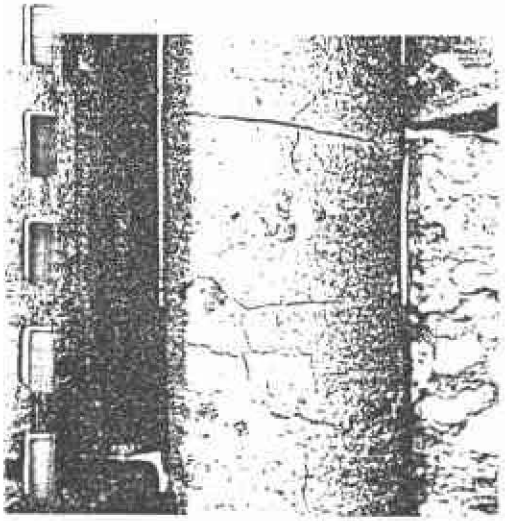
- [x] Date Copied 9/6/00 By Suzanne

10-6-88

3393

3/3

Geotechnical Report
719 2nd Ave. Building
Seattle, Washington



Martin Selig Real Estate
701 Fifth Avenue
Seattle, WA 98104

November 1987

SHANNON & WILSON, INC.

W-4861-01

CONSULTANT
William L. Shannon, P.E.

W-4861-01

SHANNON & WILSON, INC.
Geotechnical Consultants
Engineering and Applied Geosciences
1105 North 38th Street • P.O. Box C-30313 • Seattle, WA 98103-8067 • (206) 632-8020 • Cable: GEOSAW

February 9, 1988

Martin Selig Real Estate
701 Fifth Avenue
Seattle, Washington 98104-7090

Attn: Mr. Thomas Sager

GEOTECHNICAL REPORT, 719 SECOND AVENUE BUILDING, SEATTLE, WASHINGTON

Enclosed are five copies of our final geotechnical report for use in the foundation design and construction of the proposed 19-story office building to be located at 719 Second Avenue.

Our work was performed in accordance with our proposal letter of September 30, 1987 and our supplemental work letter of January 20, 1988. Prior to completing subsurface explorations at the site, we provided preliminary design data for the project based upon existing nearby borings. This information was discussed during our meeting of October 21. These preliminary design recommendations have been revised based upon our explorations at the site. These revised design criteria are discussed in the attached report.

It has been a pleasure working with you and the design team on this project. Your confidence in Shannon & Wilson is greatly appreciated.

Sincerely,

SHANNON & WILSON, INC.

W. Paul Grant

W. Paul Grant, P.E.
Associate

WPG/lkd

Enclosures: 5 copies - Geotechnical Report

ABSTRACT

This report contains recommendations for the foundation design and construction of the proposed 19-story office building at 719 Second Avenue in Seattle, Washington. The project will be located on a 108-foot by 160-foot parcel of land immediately southwest of the intersection of Second Avenue and Columbia Street. The project will include seven levels of below grade parking, extending about 30 to 45 feet below street level. The eastern half of the building will have a basement floor slab at elevation 8.5 feet and the western half of the building will have a basement floor slab at elevation 3 feet (City of Seattle Datum).

Current development at the site includes a two-story and four-story office building. Both structures have basement floor slabs located at elevation 34 to 36 feet. These basements extend into areaways located beneath the sidewalks on the north and east sides of the building. The 17-story, Hoge Building, exists immediately south of the project site. Footing elevations for the Hoge Building range between elevations 12 and 14 feet. West of the proposed project is an alley and a low-rise parking garage. Footings for the parking garage extend to elevations 6 to 9 feet.

Subsurface soil conditions at the site were evaluated from the results of four borings. These explorations indicate that the site is underlain by a sequence of surficial sands overlying cohesive till-like and clay soils which, in turn, overlie a lower sand unit. The surficial sand unit appeared to be approximately 20 feet thick in the borings. Except in areas which have been disturbed as a result of excavations for nearby buildings, it appears that this sand is medium dense. The underlying cohesive soils consist of a 20-foot-thick layer of till-like soil overlying a 10-foot-thick layer of hard, silty clay. The till-like soils are very hard except in the northeast portion of the site where these materials appear to have been disturbed, possibly as a result of an ancient landslide. Additionally, a gravel intrusion was observed within this till-like stratum in a boring located northwest of the project site. The extent of this gravel intrusion beneath the site is unknown. However, very little gravel was encountered in boring B-3 located at the southern extreme of the project (see Figure 2). Underlying the cohesive soils are very dense, gravelly sands. These sands are water-bearing and they are typically located below mean sea level.

Observation wells installed within these soils indicate a static water table at approximately elevations 0 to +3 feet.

A combination of footings and drilled piers are recommended for support of the superstructure. It is recommended that the exterior columns of the superstructure be founded upon continuous strip footings. It is recommended that these footings, when founded upon native, undisturbed site soils, be designed for a net allowable bearing pressure of 10 ksf. Alternatively, straight shaft, augercast piles may be used to support the interior and/or exterior columns of the building. Augercast piles with a minimum length of 35 feet are recommended considering uplift requirements of the columns and site conditions which would require the piers to penetrate a water-bearing sand layer which is typically located below Elev. -20 feet. It is recommended that augercast piles be designed for an allowable bearing pressure of 50 ksf and for allowable skin friction values of 1 ksf above elevation -20 and 2 ksf below elevation -20. It is recommended that augercast piles have a minimum center-to-center spacing of 1.6 times the pile diameter to minimize interaction effects upon the uplift capacity of the piers. Additionally, it is recommended to use a horizontal subgrade modulus value of 100 pci in evaluating the lateral capacity of the drilled pier foundations.

Spread footings or mats may be used as an alternative to the straight shaft augercast piles for the interior columns. It is recommended that spread footings having an embedment depth of 10 feet or greater beneath the finished floor slab be designed for an allowable bearing pressure of 15 ksf. A mat foundation may also be used for the support of the interior columns. It is recommended that the mat foundation be designed based upon an allowable soil bearing of 10 ksf and a vertical subgrade modulus value of 100 pci.

It is recommended that the seismic design of the facility be based upon a characteristic site period ranging from 0.7 to 1.1 seconds. Alternatively, an S-factor of 1.2 may be used for the seismic design of the structure based upon S_2 type soil conditions at the site. In our opinion, the very dense lower sand unit underlying the site would not liquefy during a design earthquake.

A combination of cantilever and tieback shoring is recommended for the basement excavation for the project. A cantilever soldier pile wall is recommended on the

south side of the excavation adjacent to the existing Hoge Building. It is recommended that a bench with a minimum width of 5 feet be provided adjacent to the footings of the Hoge Building and that these soils be cut at a 2:1 slope to the top of a cantilever soldier pile wall which will be constructed approximately 12 feet north of the Hoge Building. The purpose of the cantilever wall is to provide lateral support to the soils beneath the footings of the Hoge Building.

It is recommended that the other walls of the basement excavation be supported by a tieback shoring system designed in accordance with the parameters shown on Figure 5. A trapezoidal pressure distribution with a maximum lateral earth pressure of 25H is recommended for the north and east excavation walls. It is recommended that a triangular pressure distribution corresponding to an equivalent fluid weight of 35 pcf be used on the west excavation wall, as forces on this wall are affected by the limited section of soil between the project and the adjacent parking garage on the west. Anchors for restraining movements of the shoring wall may be preliminarily sized for an allowable friction value of 1 ksf for the clayey soils at the site and 2 ksf for the lower sands.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

LIST OF FIGURES

NOTE

Vicinity map from USGS 7.5 minute topographic quadrangle: Seattle South, WA (1949, rev. 1968 and 1973).

719 2nd Ave. Building
Seattle, Washington

VICINITY MAP

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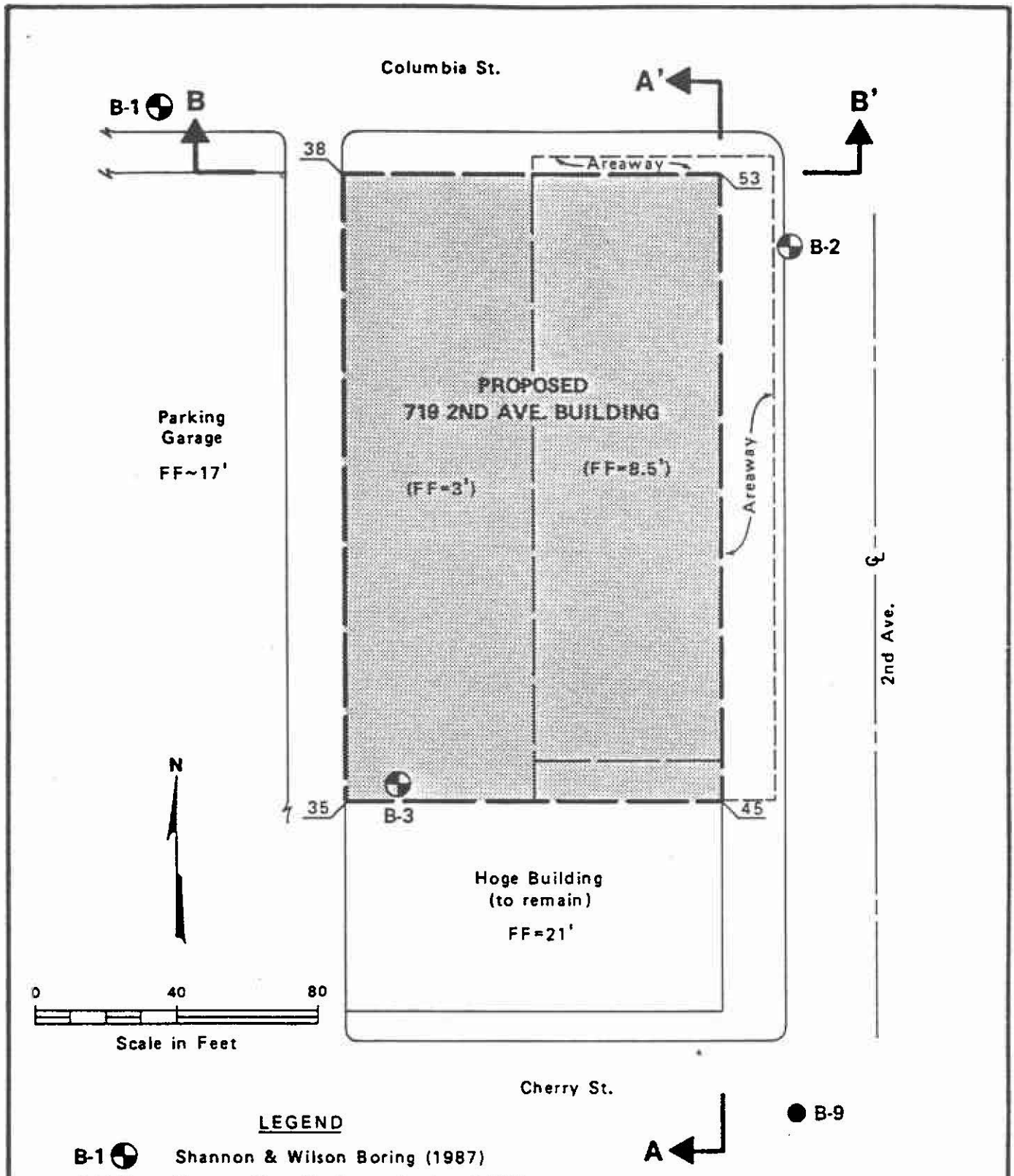
FIG. 1



LEGEND

B-1	Shannon & Wilson Boring (1987)
B-9	Metropolitan Engineers Boring (1965)
FF=21'	Existing or Proposed Finished Floor Elevation in Basement
45	Spot Elevation on Exterior of Building
A'	Subsurface Profile

NOTES

1. Site plan based upon DCLU permit drawings prepared by Chester Lindsey Architects, dated 9-30-87.
2. Vertical datum - City of Seattle.

719 2nd Ave. Building
Seattle, Washington

SITE AND EXPLORATION PLAN

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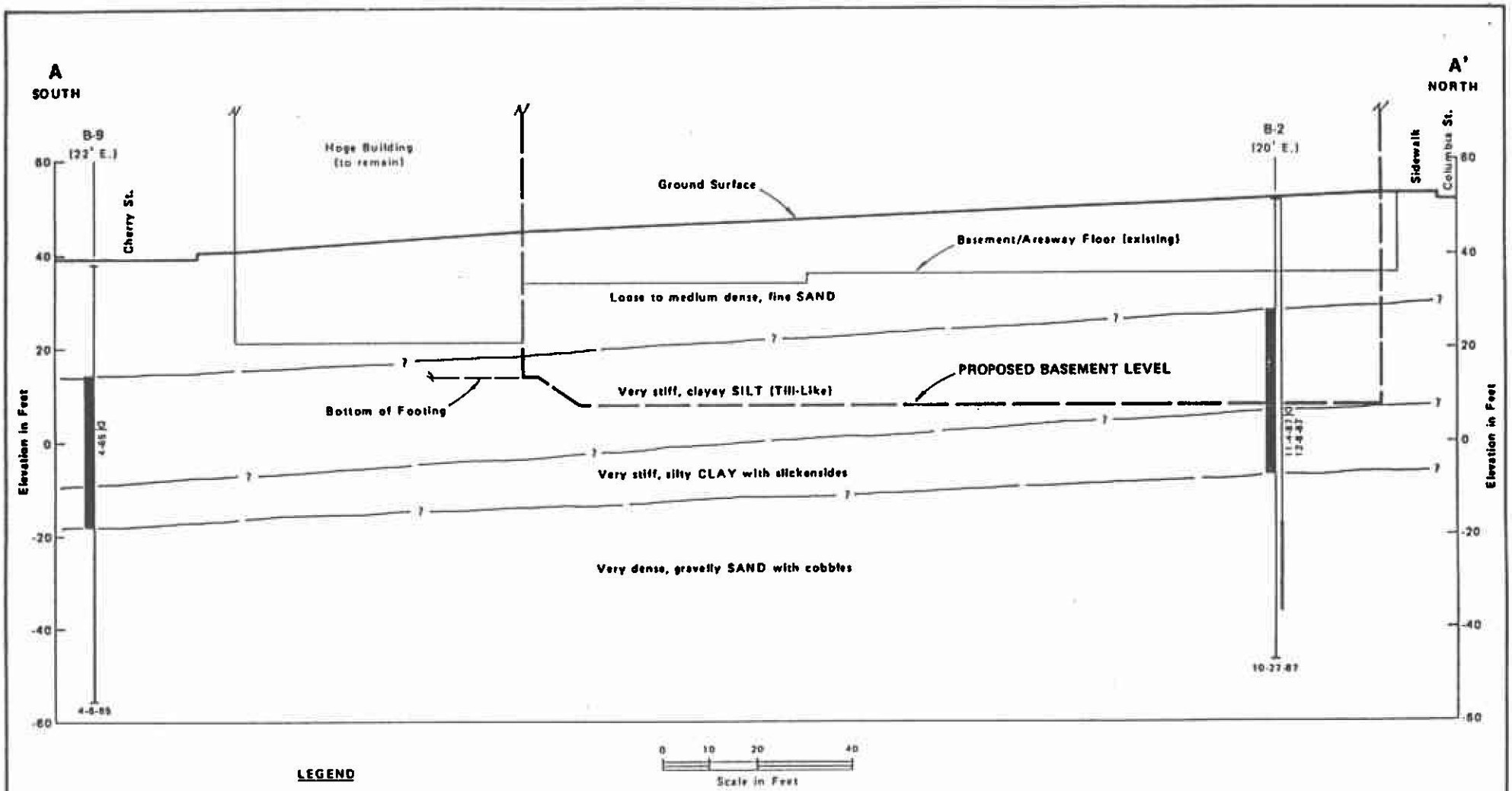
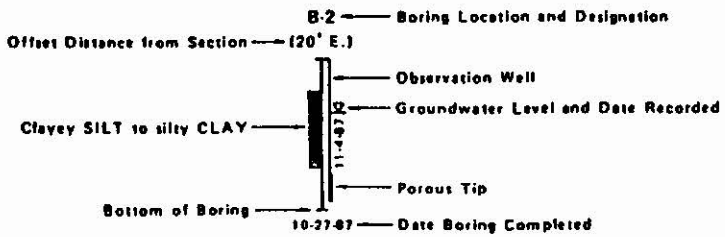
FIG. 2



LEGEND



NOTES

1. See Figure 2 for plan location of borings and sections.
2. This profile is generalized from materials encountered in the site borings. Variations between the profile and actual conditions may exist.

719 2nd Ave. Building
Seattle, Washington

SUBSURFACE PROFILE
SECTION A-A'

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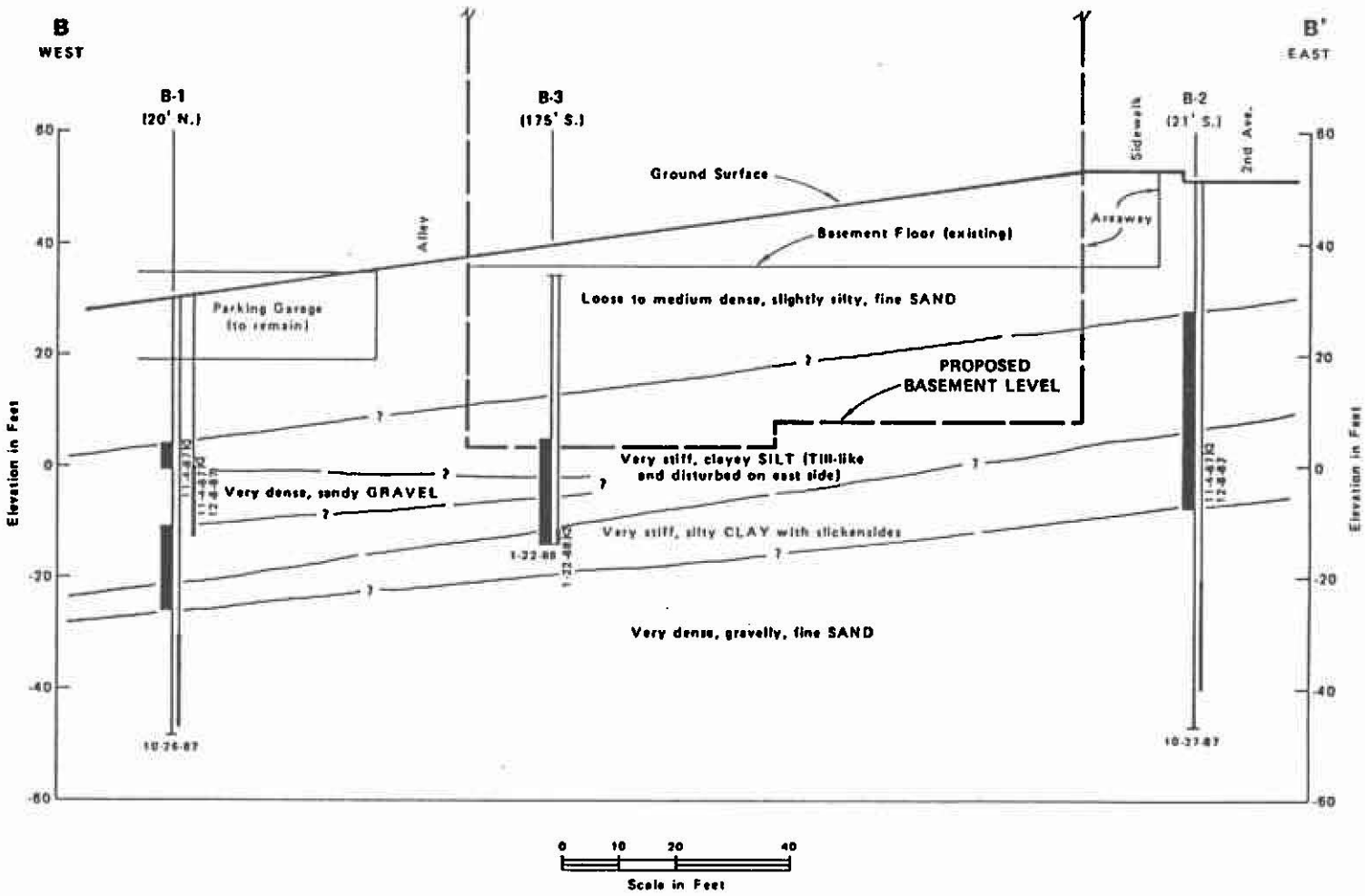
FIG. 3



See Figure 3 for Legend and Notes.

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Seattle, Washington

SUBSURFACE PROFILE
SECTION B-B'

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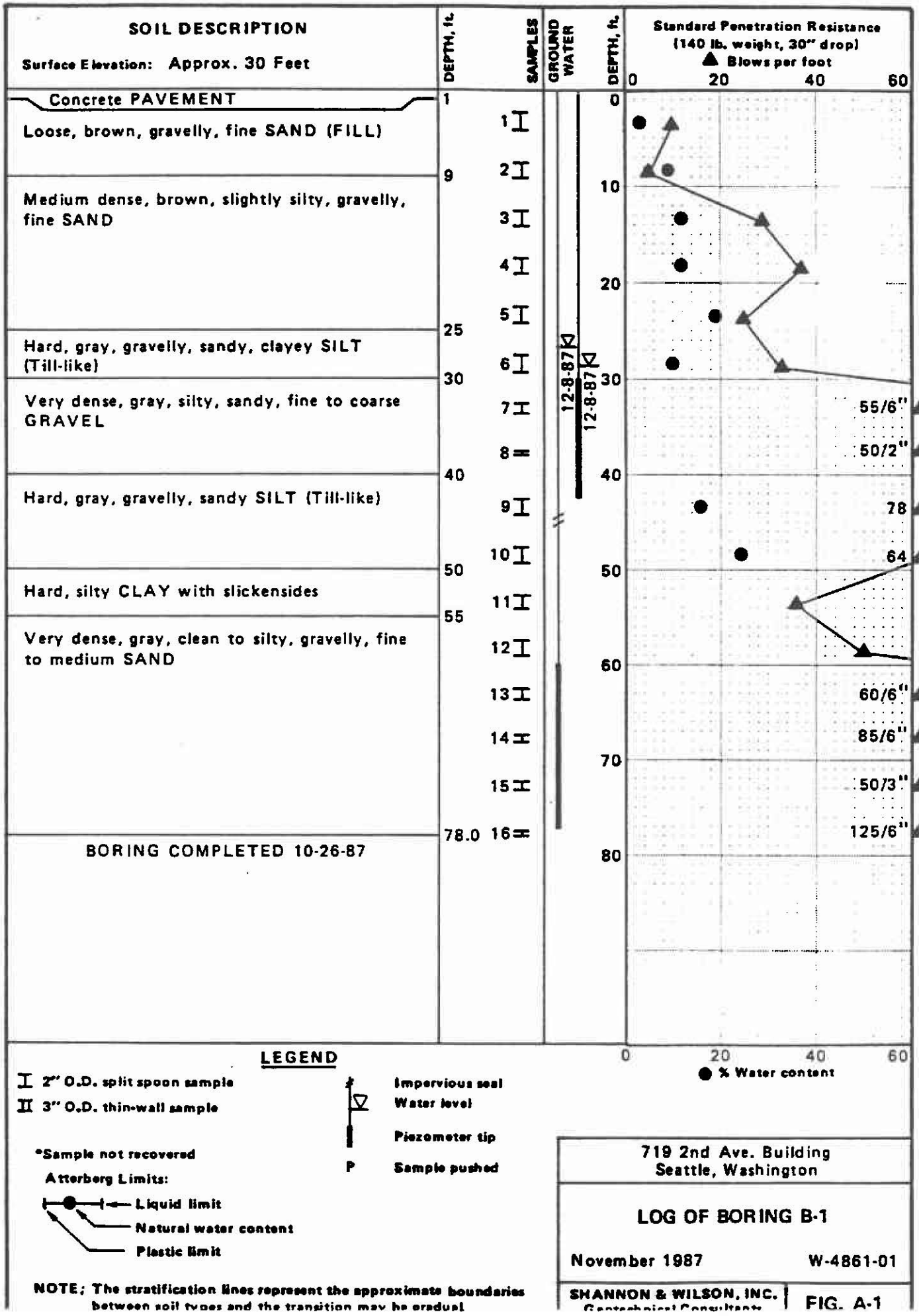
FIG. 4


SOIL DESCRIPTION
Surface Elevation: Approx. 30 Feet
DEPTH, ft.
SAMPLES
GROUND WATER
DEPTH, ft.
Standard Penetration Resistance
(140 lb. weight, 30" drop)
Blows per foot
0
20
40
60
Concrete PAVEMENT
Loose, brown, gravelly, fine SAND (FILL)
Medium dense, brown, slightly silty, gravelly, fine SAND
Hard, gray, gravelly, sandy, clayey SILT (Till-like)
Very dense, gray, silty, sandy, fine to coarse GRAVEL
Hard, gray, gravelly, sandy SILT (Till-like)
Hard, silty CLAY with slickensides
Very dense, gray, clean to silty, gravelly, fine to medium SAND
BORING COMPLETED 10-26-87
1
9
25
30
40
50
55
78.0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
12-8-87
12-8-87
0
10
20
30
40
50
60
70
80
55/6"
50/2"
78
64
60/6"
85/6"
50/3"
125/6"
% Water content
LEGEND
2" O.D. split spoon sample
3" O.D. thin-wall sample
*Sample not recovered
Atterberg Limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P
Sample pushed
NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual
719 2nd Ave. Building
Seattle, Washington
LOG OF BORING B-1
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W-4861-01
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FIG. A-1

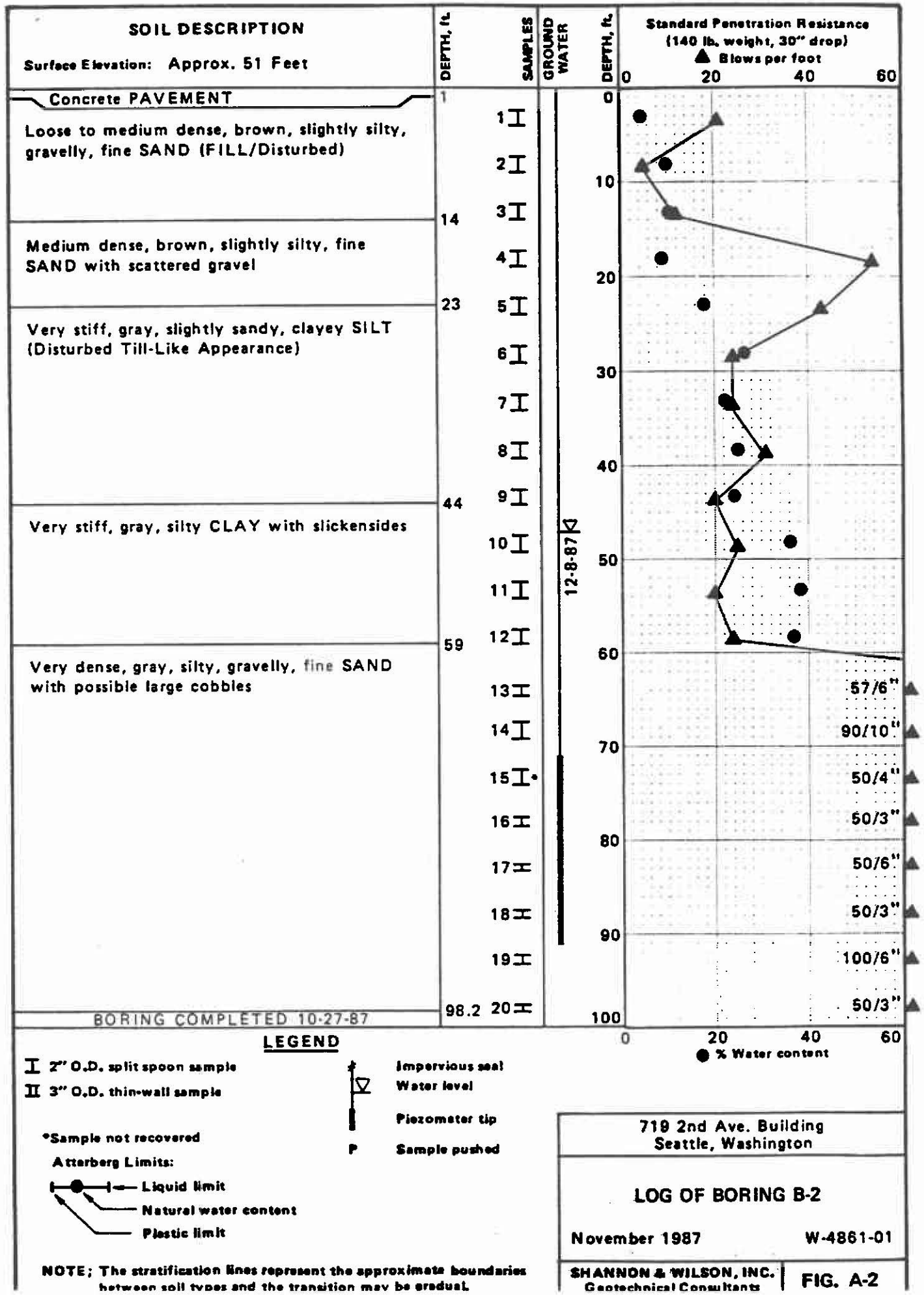
SOIL DESCRIPTION
Surface Elevation: Approx. 51 Feet
DEPTH, ft.
SAMPLES
GROUND WATER
DEPTH, ft.
Standard Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
60
Concrete PAVEMENT
Loose to medium dense, brown, slightly silty, gravelly, fine SAND (FILL/Disturbed)
1
14
Medium dense, brown, slightly silty, fine SAND with scattered gravel
23
Very stiff, gray, slightly sandy, clayey SILT (Disturbed Till-Like Appearance)
44
Very stiff, gray, silty CLAY with slickensides
59
Very dense, gray, silty, gravelly, fine SAND with possible large cobbles
98.2
BORING COMPLETED 10-27-87
12-8-87
57/6"
90/10"
50/4"
50/3"
50/6"
50/3"
100/6"
50/3"
● % Water content
LEGEND
2" O.D. split spoon sample
3" O.D. thin-wall sample
*Sample not recovered
Atterberg Limits:
Liquid limit
Natural water content
Plastic limit
Impervious seal
Water level
Piezometer tip
P Sample pushed
NOTE; The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
719 2nd Ave. Building
Seattle, Washington
LOG OF BORING B-2
November 1987
W-4861-01
SHANNON & WILSON, INC.
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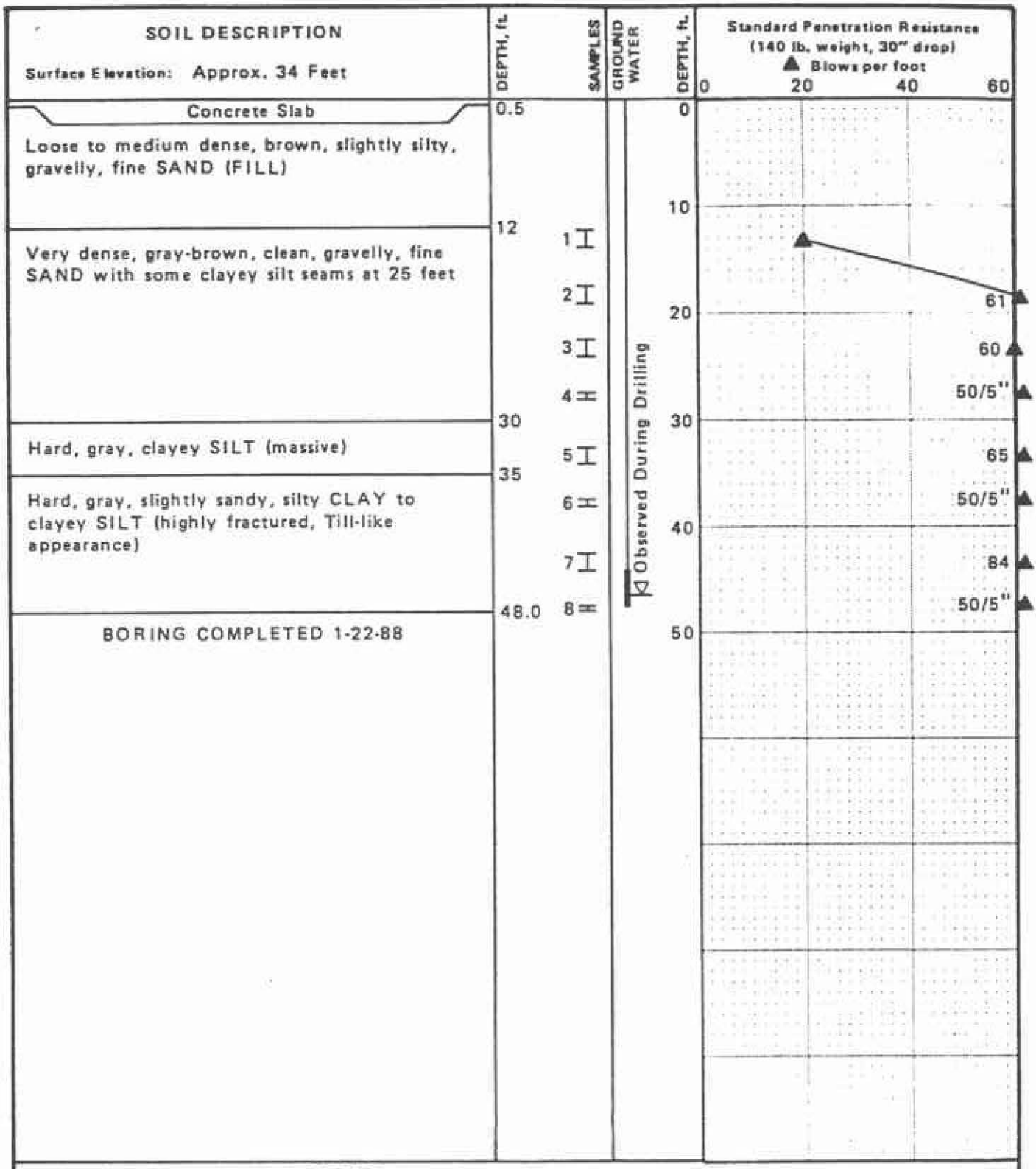
FIG. A-2



LEGEND

- I 2" O.D. split spoon sample
- II 3" O.D. thin-wall sample
- *Sample not recovered
- Atterberg Limits:
  - Liquid limit
  - Natural water content
  - Plastic limit
- Impervious seal
- Water level
- Piezometer tip
- P Sample pushed
- ● % Water content

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

719 2nd Ave. Building
Seattle, Washington

LOG OF BORING B-3

February 1988 W-4861-01

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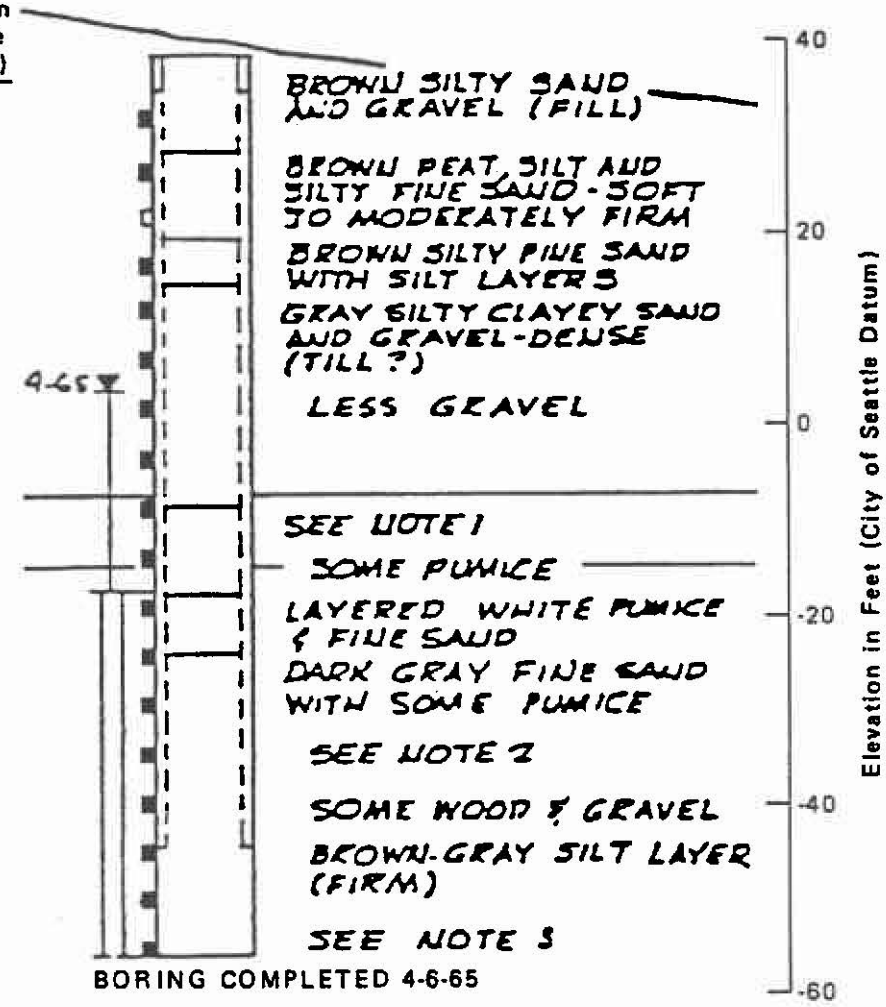
FIG. A-3

Dry Weight (pcf)	Water Content (%)	Penetration Resistance (Blows/Ft)
129	14	8
90	33	2
		8/14"
107	20	42
133	11	40/6"
131	10	80/2"
127	12	70/6"
136	6	100/6"
126	10	70/6"
97	26	30/6"
56	77	70/6"
106	19	60/6"
106	21	80/6"
111	18	45/6"
94	29	100/6"
92	28	30/6"
97	27	100/6"
98	26	100/6"



NOTES:

1. LAYERED GRAY FINE SAND, SILT, CLAY & BROWN PEATY SILT - DENSE & FIRM
2. GRADES FINER, CONTAINS SOME SILT AND ORGANIC MATERIAL
3. CASING PULLED BACK TO EL. 71, BORING AT EL. 53, OVERNIGHT WL TO EL. 105
4. CASING PULLED BACK TO EL 141. BORING BACKFILLED W/ PEA GRAVEL, EL 53 TO EL 85, & EL 89 TO EL 142, FINE SAND EL 85 TO EL 89. 2' LONG SANDED WELL POINT INSTALLED W/ TIP AT EL 85 & PLASTIC RISER PIPE TO SURFACE

NOTES

1. Boring from Metropolitan Engineers (1966).
2. Boring located near intersection of 2nd and Cherry.
3. Elevation 100 = -6 (City of Seattle Datum).
4. Boring drilled with cable tool equipment.
5. Samples obtained with 2.5" I.D. sampler driven by a 500 lb. weight falling 20".

719 2nd Ave. Building
Seattle, Washington

LOG OF BORING 9

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FIG. A-4