- ☐ City box number 16th - 19th Ave
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☐ Report Date
  - ☐ Project name
  - ☑ Company's job number
  - ☐ 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
  - ☑ Site address (may be on 1st or 2nd page of text)
- ☑ Executive Summary and associated figures
- ☐ Table of Contents
- ☐ Project Location Plan/Map or Vicinity Map
- ☑ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☐ Cross Sections/Subsurface Profiles
- ☐ Fill or Peat Thickness Maps and Contour Maps
- ☑ 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_____

328

- ☐ Date Copied 7-14-99 By AB

2/9/99

SUBSURFACE INVESTIGATIONS

FOR 500 17th Ave

PROPOSED ADDITIONS TO 556444

PROVIDENCE HOSPITAL

(328)

SEATTLE, WASHINGTON

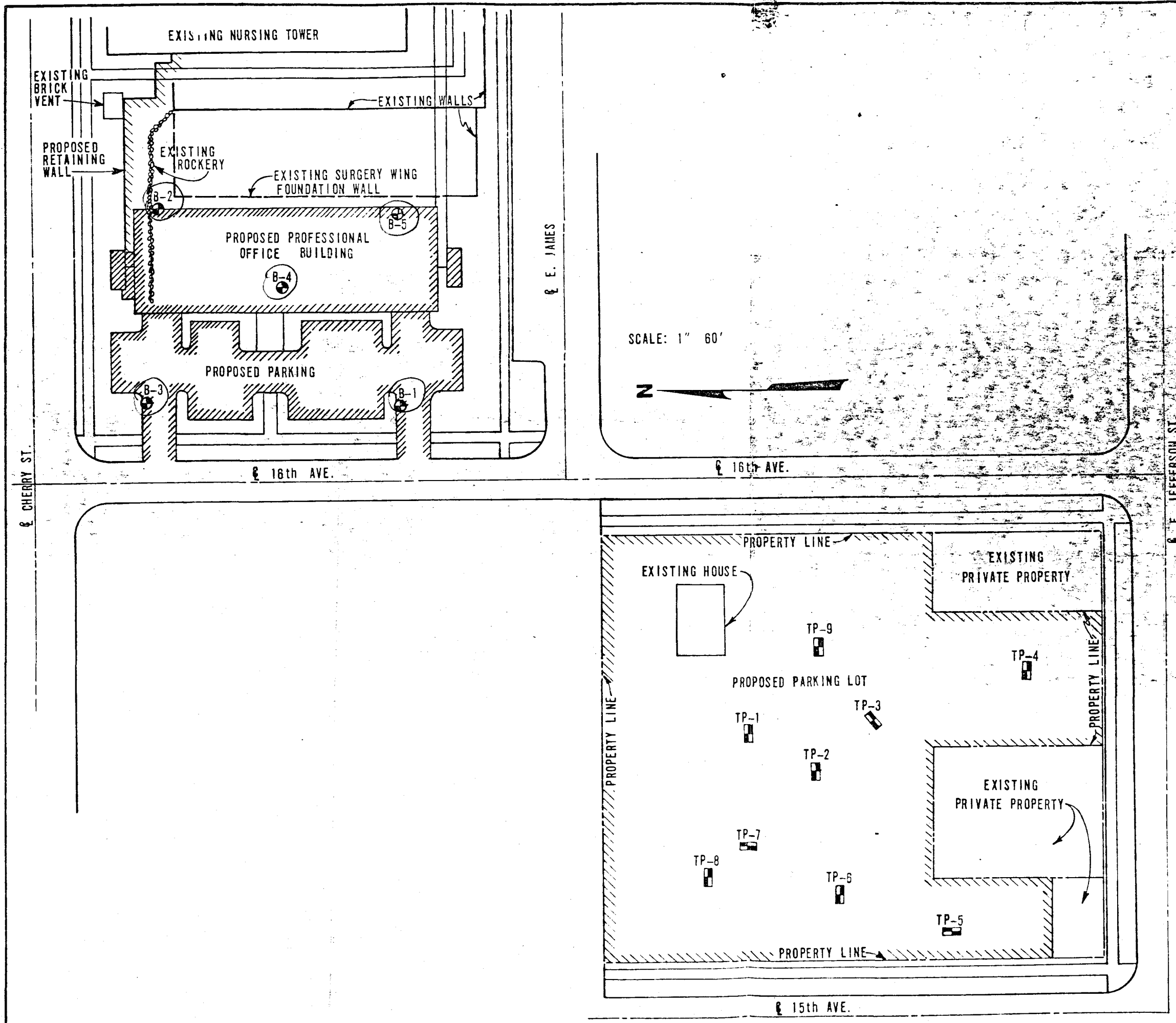
14/14

500 17TH AV

A. INTRODUCTION

This report presents the results of subsurface investigations and engineering studies together with our conclusions and recommendations relating to earthwork and foundation design for proposed additions to Providence Hospital, Seattle. The presently planned additions consist of a professional office building with limited parking west of the existing underground surgery wing, and a parking lot to be constructed southwest of the intersection of East James Street and 16th Avenue, all as shown on Figure 1.

The preliminary concept for the professional building consisted of a reinforced concrete structure 4 to 8 stores high with a maximum 2 levels of parking below grade along East James Street. At a meeting on October 26, 1971 in the offices of Leo Daly & Associates, we were informed that the building concept had been revised and that it now consisted of a 2-story structure with no below grade parking. Parking space would be provided at about present grade beneath the structure. Two additional stories would be added to the first 2 stories in the future. This structure was to be U-shaped with a court in the center and extend over the area west of the existing underground surgery wing to 16th Avenue.



LEGEND:

B-4 BORING LOCATION AND NUMBER

TP-6 TEST PIT LOCATION AND NUMBER

NOTE:

PROPOSED BUILDING LOCATION PLAN BASED ON DRAWING BY LEO A. DALY PLANNING ARCHITECTS ENGINEERS, SEATTLE, WASH., TITLED "SITE PLAN", UNDATED

PROPOSED PARKING LOT PLAN BASED ON DRAWING BY HORTON DENNIS & ASSOCIATES, INC., SEATTLE, WASH., TITLED "PROVIDENCE HOSPITAL PROPERTY SURVEY & TOPOGRAPHY" DATED 1/26/72 SUPPLIED BY LEO A. DALY

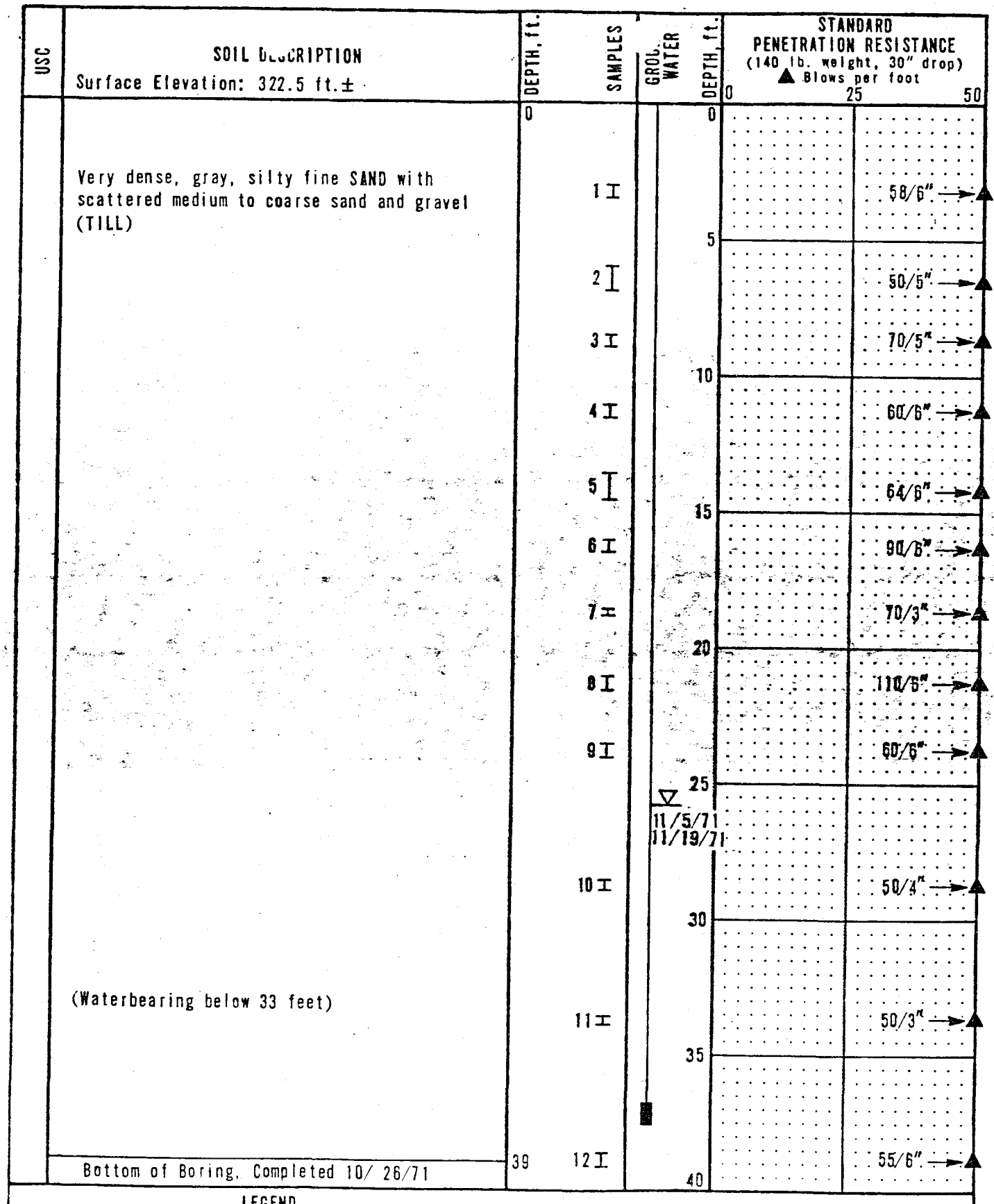
PROPOSED ADDITIONS TO
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

PLAN OF INVESTIGATIONS

FEBRUARY 4, 1972 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 1



LEGEND

I 2.0" O.D split spoon sample

II 3.0" O.D. thin-wall sample

* Sample not recovered

Atterberg limits:
Liquid limit
Natural water content
Plastic limit

Water level

Porous Tip

P Sampler pushed

USC Unified Soil Classification

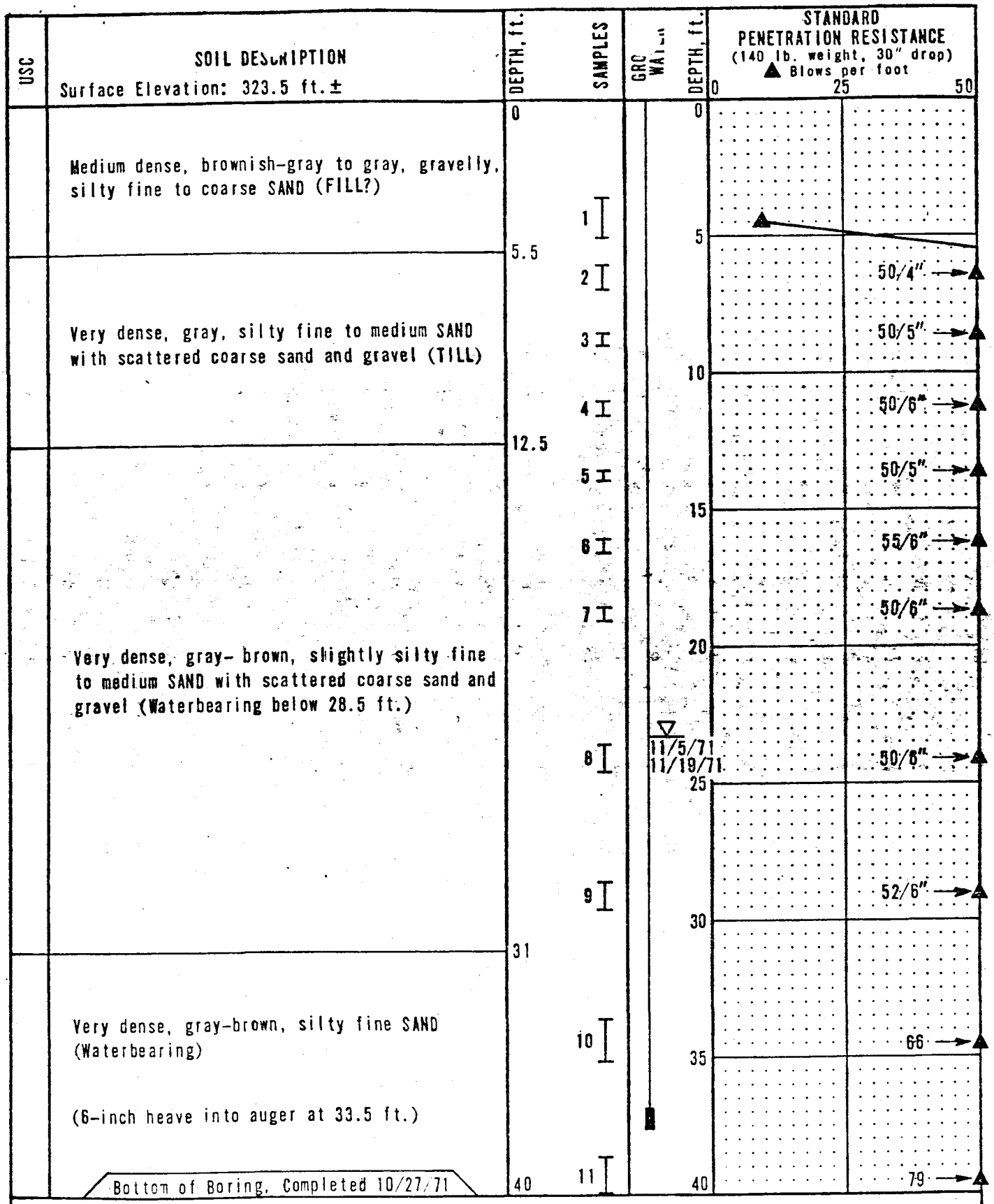
● % Water content

PROFESSIONAL OFFICE BUILDING FOR
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

LOG OF BORING NO. B-1

NOVEMBER 18, 1971 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS



LEGEND

I 2.0" O.D. split spoon sample

II 3.0" O.D. thin-wall sample

* Sample not recovered

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

Water level

Porous Tip

P Sampler pushed

USC Unified Soil Classification

● % Water content

PROFESSIONAL OFFICE BUILDING FOR
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

LOG OF BORING NO. B-2

NOVEMBER 18, 1971 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 3

USC	SOIL L .RIPTION Surface Elevation: 327.5 ft. ±	DEPTH, ft.	SAMPLES	GRL WATER	DEPTH, ft.	STANDARD PENETRATION RESISTANCE (140 lb. weight, 30" drop) ▲ Blows per foot 0 25 50
	Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (TILL)	0	1 I		0	50/6" →
			2 I		5	50/4" →
			3 I			65/6" →
			4 I		10	50/4" →
			5 II			50/3" →
			6 I		15	60/6" →
	Bottom of Boring, Completed 10/27/71	18.5	7 I	Dry 11/5/71 11/19/71	20	50/6" →

LEGEND

I 2.0" O.D. split spoon sample

II 3.0" O.D. thin-wall sample

* Sample not recovered

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

Water level

Porous Tip

P Sampler pushed

USC Unified Soil Classification

● % Water content

PROFESSIONAL OFFICE BUILDING FOR
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

LOG OF BORING NO. B-3

NOVEMBER 18, 1971 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG 4

USC	SOIL DESCRIPTION Surface Elevation: 323.5 ft.±	DEPTH, ft.	SAMPLES	GP WATER	DEPTH, ft.	STANDARD PENETRATION RESISTANCE (140 lb. weight, 30" drop) ▲ Blows per foot 0 25 50
	Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (TILL)	0	1 I		0	50/3" → ▲
			2 I		5	63/6" → ▲
			3 I			60/6" → ▲
			4 I		10	66/6" → ▲
			5 I			54/6" → ▲
			6 I		15	50/4" → ▲
	Bottom of Boring, Completed 10/27/71	18.9	7 H			50/5" → ▲
					20	

LEGEND

I 2.0" O.D. split spoon sample

II 3.0" O.D. thin-wall sample

* Sample not recovered

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

Water level

Porous Tip

P Sampler pushed

USC Unified Soil Classification

● % Water content

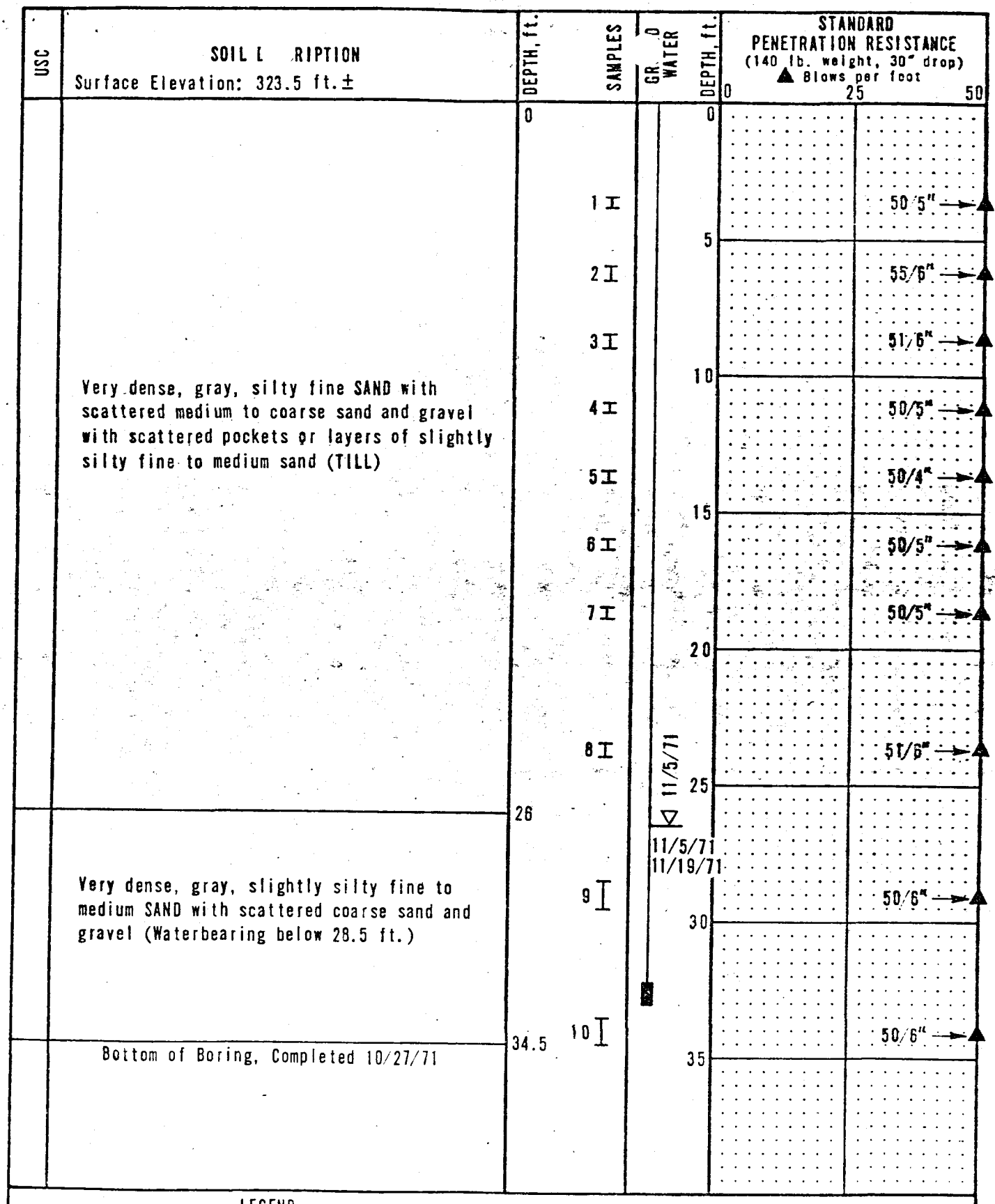
PROFESSIONAL OFFICE BUILDING FOR
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

LOG OF BORING NO. B-4

NOVEMBER 18, 1971 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 5



LEGEND

I 2.0" O.D split spoon sample

II 3.0" O.D. thin-wall sample

* Sample not recovered

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

Water level

Porous Tip

P Sampler pushed

USC Unified Soil Classification

● % Water content

PROFESSIONAL OFFICE BUILDING FOR
PROVIDENCE HOSPITAL
SEATTLE, WASHINGTON

LOG OF BORING NO. B-5

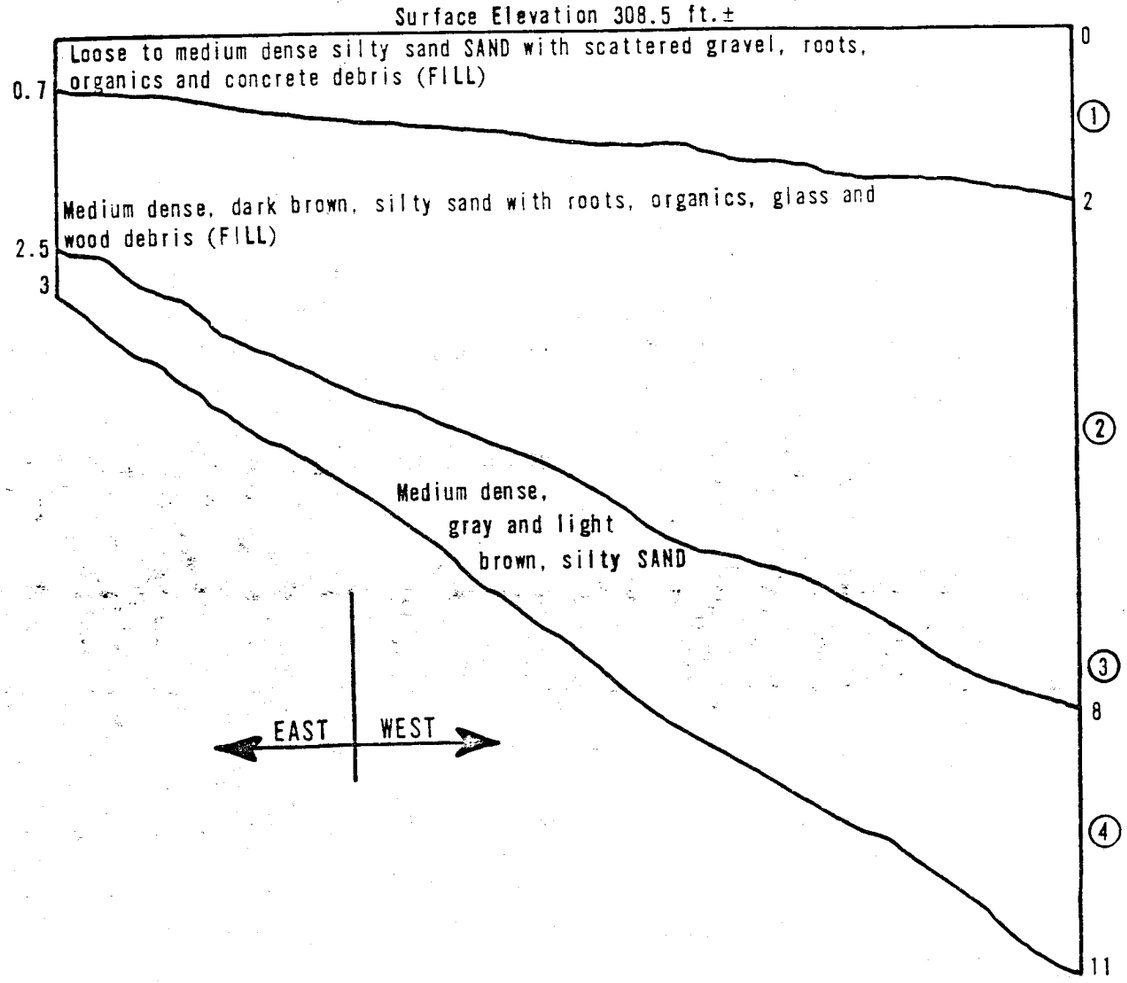
NOVEMBER 18, 1971 W-2249-01

SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 6

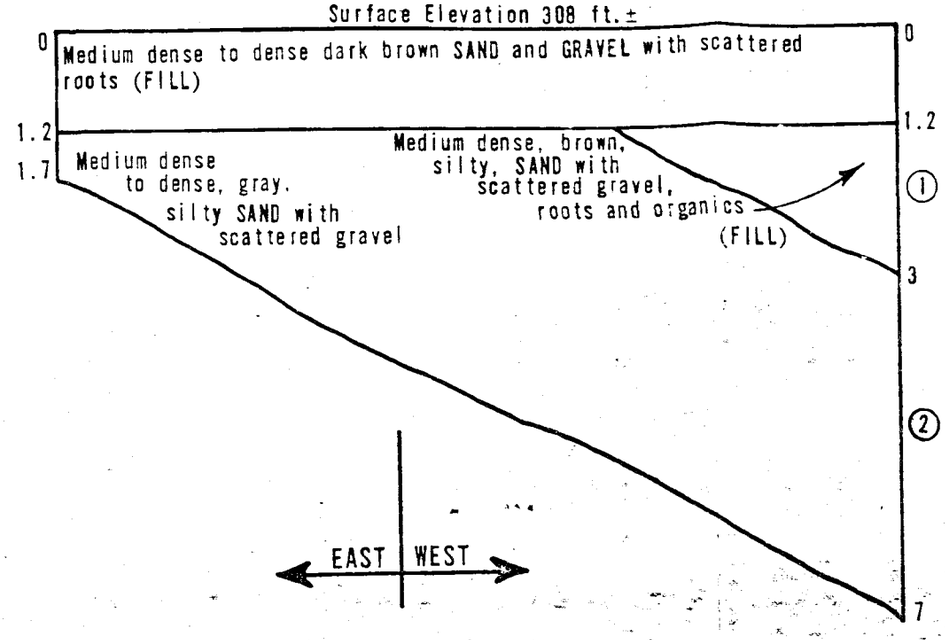
TP-1*

Surface Elevation 308.5 ft.±



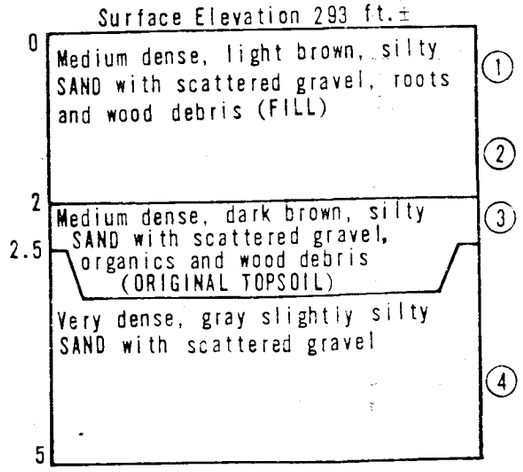
TP-2 *

Surface Elevation 308 ft.±



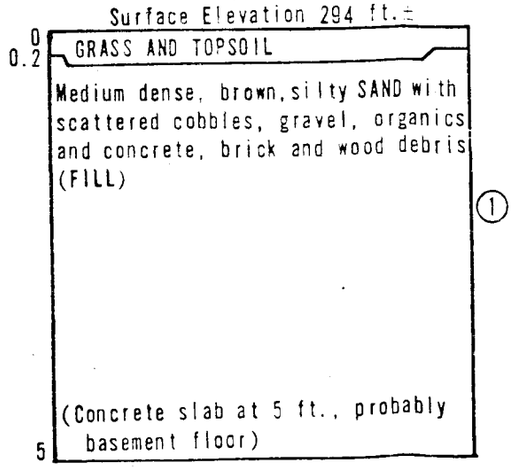
TP-6

Surface Elevation 293 ft.±



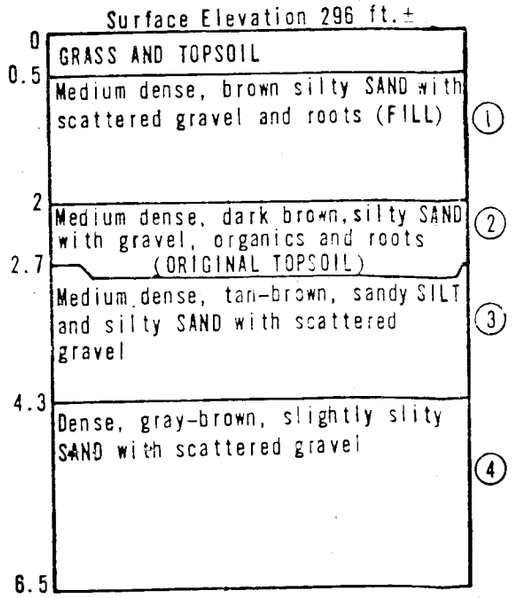
TP-7

Surface Elevation 294 ft.±



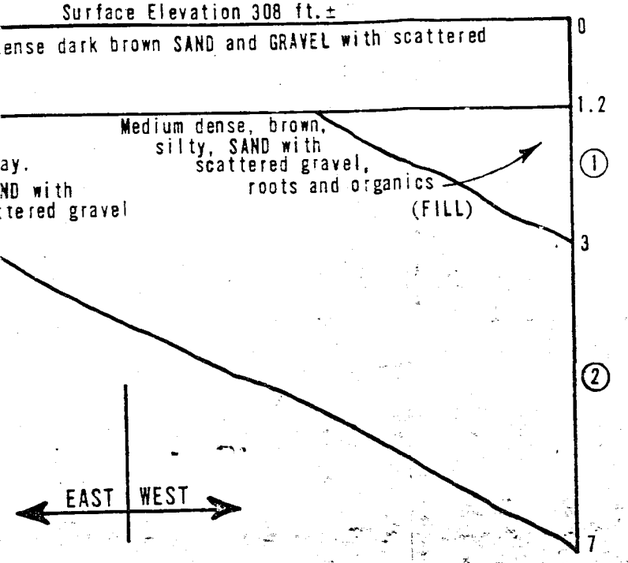
TP-8

Surface Elevation 296 ft.±



TP-2 *

Surface Elevation 308 ft.±



TP-3

Surface Elevation 308 ft.±

0	Medium dense gray, slightly silty to silty SAND with scattered cobbles, gravel, organics and wood debris (FILL) (Black top pavement at 5 ft.)	①
5.5	Medium dense, dark brown, silty SAND with scattered gravel, roots and organics (ORIGINAL TOPSOIL) (Blacktop pavement debris at 7 ft.)	②
8	Medium dense, gray silty SAND	③
10.5		

TP-4

Surface Elevation 298 ft.±

	Medium dense grayish brown, SAND with scattered gravel, cobbles, organics and roots (FILL)	①
1.2	Part of brick and concrete foundation	
2	Dense to very dense, gray gravelly silty SAND with scattered cobbles (TILL) (Slight seepage at 4.5 ft.)	
4.5		

TP-5

Surface Elevation 284 ft.±

	Loose, dark gray, silty SAND with wood and broken concrete debris (FILL) (Slight seepage at 3 ft.)	
3	Medium dense, tan-brown, silty SAND with scattered gravel and cobbles	①
4.5		

NOTE:

Test pits excavated 1/21/72

LEGEND:

* Log of test pit is along length of pit

① Grab Sample number of typical materials for depth interval

Vertical Scale: 1"= 2'

TP-8

Surface Elevation 296 ft.±

0	GRASS AND TOPSOIL	
0.5	Medium dense, brown silty SAND with scattered gravel and roots (FILL)	①
2	Medium dense, dark brown, silty SAND with gravel, organics and roots (ORIGINAL TOPSOIL)	②
2.7	Medium dense, tan-brown, sandy SILT and silty SAND with scattered gravel	③
4.3	Dense, gray-brown, slightly silty SAND with scattered gravel	④
6.5		

TP-9

Surface Elevation 309.5 ft.±

0	Crushed rock surfacing (1 inch size)	①
0.2	Very dense, gray silty SAND with scattered gravel (TILL)	
0.7	Dense, gray-brown silty SAND with scattered gravel	②
2.5		

PROVIDENCE HOSPITAL PARKING LOT
SEATTLE, WASHINGTON

LOGS OF TEST PITS

JANUARY 21, 1972 W-2249-01
SHANNON & WILSON, INC.
SOIL MECHANICS & FOUNDATION ENGINEERS

FIG. 7

SUMMARY OF TEST RESULTS

BORING NO. B-1

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
1	3.5-4	58							Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (Damp) (Till)
2	6-6.9	40, 50/5"							Same as above
3	85-8.9	70/5"							Very dense, gray, slightly silty, fine SAND with scattered medium to coarse sand and gravel (Damp) (Till)
4	11-11.5	60							Same as above
5	13.5-14.5	50, 64							Same as above
6	16-16.5	90							Same as above
7	18.5-18.8	70/3"							Same as above
8	21-21.5	110							Same as above
9	23.5-24	60							Same as above

BORING NO. B-1 SHEET NO. 1

SUMMARY OF TEST RESULTS

BORING NO. B-1

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
10	28.5-28.9	50/4"							Very dense, gray, silty, fine to medium SAND with scattered coarse sand and gravel (Damp)(Till)
11	33.5-33.8	50/3"							Very dense, gray, silty, gravelly, fine to coarse SAND (Wet) (Till)
12	38.5-39	55							Same as above except slightly silty to silty

BORING NO. B-1

SHEET NO. 2

SUMMARY OF TEST RESULTS

BORING NO. B-2

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
1	3.5-5	7,5,5							Medium dense, brownish-gray, silty, fine to medium SAND with scattered coarse sand and gravel (Moist) (Fill)
2	6-6.9	39, 50/4"							Very dense, gray, silty, gravelly, fine to coarse SAND (Damp) (Till)
3	8.5-8.9	50/5"							Very dense, gray, silty, fine to medium SAND with scattered coarse sand and gravel (Damp) (Till)
4	11-11.5	50							Same as above
5	13.5-13.9	50/5"							Very dense, gray-brown, slightly silty to clean, fine to medium SAND with scattered coarse sand and gravel (Moist)
6	16-16.5	55							Same as above
7	18.5-19	50							Same as above
8	23.5-24.5	33,50							Very dense, gray-brown, fine to medium SAND with trace of silt with scattered coarse sand and gravel (Moist)
9	28.5-29.5	26,52							Same as above except gravelly and wet

BORING NO. B-2 SHEET NO. 3

SUMMARY OF TEST RESULTS

BORING NO. B-2

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
10	33.5-35	16,26, 40							Very dense, gray-brown, silty fine SAND (Wet)
11	38.5-40	16,34, 45							Same as above

BORING NO. B-2 SHEET NO. 4

SUMMARY OF TEST RESULTS

BORING NO. B-3

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/ 6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
1	3-4	22,50							Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (Moist) (Till)
2	5.5-5.9	50/4"							Same as above
3	8-8.5	65							Same as above
4	10.5-10.9	50/4"							Same as above
5	13-13.3	50/3"							Same as above
6	15.5-16	60							Same as above
7	18-18.5	50							Same as above

BORING NO. B-3 SHEET NO. 5

SUMMARY OF TEST RESULTS

BORING NO. B-4

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
1	3.5-4.3	49, 50/3"							Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (Damp)(Till)
2	6-6.5	63							Same as above
3	8.5-9	60							Same as above
4	11-11.5	66							Same as above
5	13.5-14	54							Same as above
6	16-16.4	50/4"							Same as above
7	18.5-18.9	50/5"							Same as above

BORING NO. B-4 SHEET NO. 6

SUMMARY OF TEST RESULTS

BORING NO. B-5

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 10/29/71

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/6"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
1	3.5-3.9	50/5"							Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (Moist) (Till)
2	6-6.5	55							Same as above except damp
3	8.5-9	51							Same as above except damp
4	11-11.4	50/5"							Same as above except damp
5	13.5-13.9	50/4"							Same as above, slightly silty except damp
6	16-16.4	50/5"							Same as above except damp
7	18.5-18.9	50/5"							Very dense, gray, slightly silty, fine to medium SAND with scattered coarse sand and gravel (Moist)
8	23.5-24	51							Very dense, gray, silty fine SAND with scattered medium to coarse sand and gravel (Moist) (Till)
9	28.5-29.5	25,50							Very dense, gray, slightly silty, fine to medium SAND with scattered coarse sand and gravel (Wet)
10	33.5-34.5	33,50							Same as above

BORING NO. B-5 SHEET NO. 7

SUMMARY OF TEST RESULTS - TEST PITS

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 2/4/72

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
TP-1									
S-1	0-2		16.8						Grayish-brown, silty, fine to coarse SAND with scattered gravel organics and concrete debris (Fill)
S-2	2-7		32.3						Dark brown, silty fine SAND with organics, roots, glass and wood debris (Fill)
S-3	7-7.5		12.7						Gray, silty fine to coarse SAND.
S-4	8-11		16.5						Light brown, slightly clayey, fine sandy SILT with scattered roots and organics.

SUMMARY OF TEST RESULTS - TEST PITS

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 2/ 4/72

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
TP-2									
S-1	1.2-3		22.2						Brown, silty, fine to medium SAND with scattered coarse sand, gravel roots and organics.
S-2	3-5		11.5						Gray, silty, fine to medium SAND with scattered gravel.
TP-3									
S-1	0-5.5		9.1						Gray, slightly silty, fine to medium SAND with scattered gravel (Fill)
S-2	5.5-8		16.4						Dark brown, silty fine SAND with scattered medium to coarse sand, gravel, roots and organics (Topsoil)
S-3	7		13.8						Gray, silty, fine to medium SAND with scattered coarse sand charcoal, gravel, shells and glass debris.

SHEET NO. 9

SUMMARY OF TEST RESULTS - TEST PITS

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 2/ 4/72

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
TP-4									
S-1	2-4.5		9.4						Grayish-brown, silty, fine to medium SAND with scattered coarse sand and gravel.
TP-5									
S-1	3-4		11.2						Tannish, light brown, silty, fine to medium SAND with scattered coarse sand and gravel.
TP-6									
S-1	0-1		14.9						Light brown, silty, fine to medium SAND with scattered coarse sand, gravel, roots and wood debris (Fill)
S-2	1-2		15.5						Light brown, silty, fine to medium SAND with scattered coarse sand, gravel, organics and roots, (Fill)
S-3	2-2.5		17.2						Dark brown, silty, fine SAND with scattered, medium to coarse sand, gravel and organics (Topsoil)
S-4	2.5-4.5		13.6						Gray, slightly silty, fine to medium SAND with scattered coarse sand and gravel. Iron-oxide stains.

SHEET NO. 10

SUMMARY OF TEST RESULTS - TEST PITS

SHANNON & WILSON, INC.

JOB NO. W-2249-01 DATE 2/4/72

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
TP-7									
S-1	0.2-5		17.0						Brown, silty, fine to medium SAND with scattered coarse sand, gravel, organics and wood debris (Fill)
TP-8									
S-1	0.5-2		15.2						Grayish-brown, silty, fine to coarse SAND with scattered gravel and roots (Fill)
S-2	2-2.7		32.6						Dark brown, silty, fine SAND with scattered medium to coarse sand, gravel, organics and roots (Topsoil)
S-3	2.8-4.3		23.8						Tannish, light brown, fine sandy SILT and silty fine SAND with scattered gravel.
S-4	4.3-6.5		12.9						Grayish-brown, silty, fine to medium SAND with scattered coarse sand and gravel.
TP-9									
S-1	0.2-0.7		6.6						Gray, silty fine SAND with scattered medium to coarse sand and gravel (Till)
S-2	0.7-2.5		10.0						Gray-brown, silty, fine SAND with scattered medium to coarse sod and gravel.

SHEET NO. 11

- ☐ City box number 16th - 19th
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☑ Report Date
  - ☐ Project name
  - ☑ Company's job number
  - ☑ 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
  - ☑ Site address (may be on 1st or 2nd page of text)
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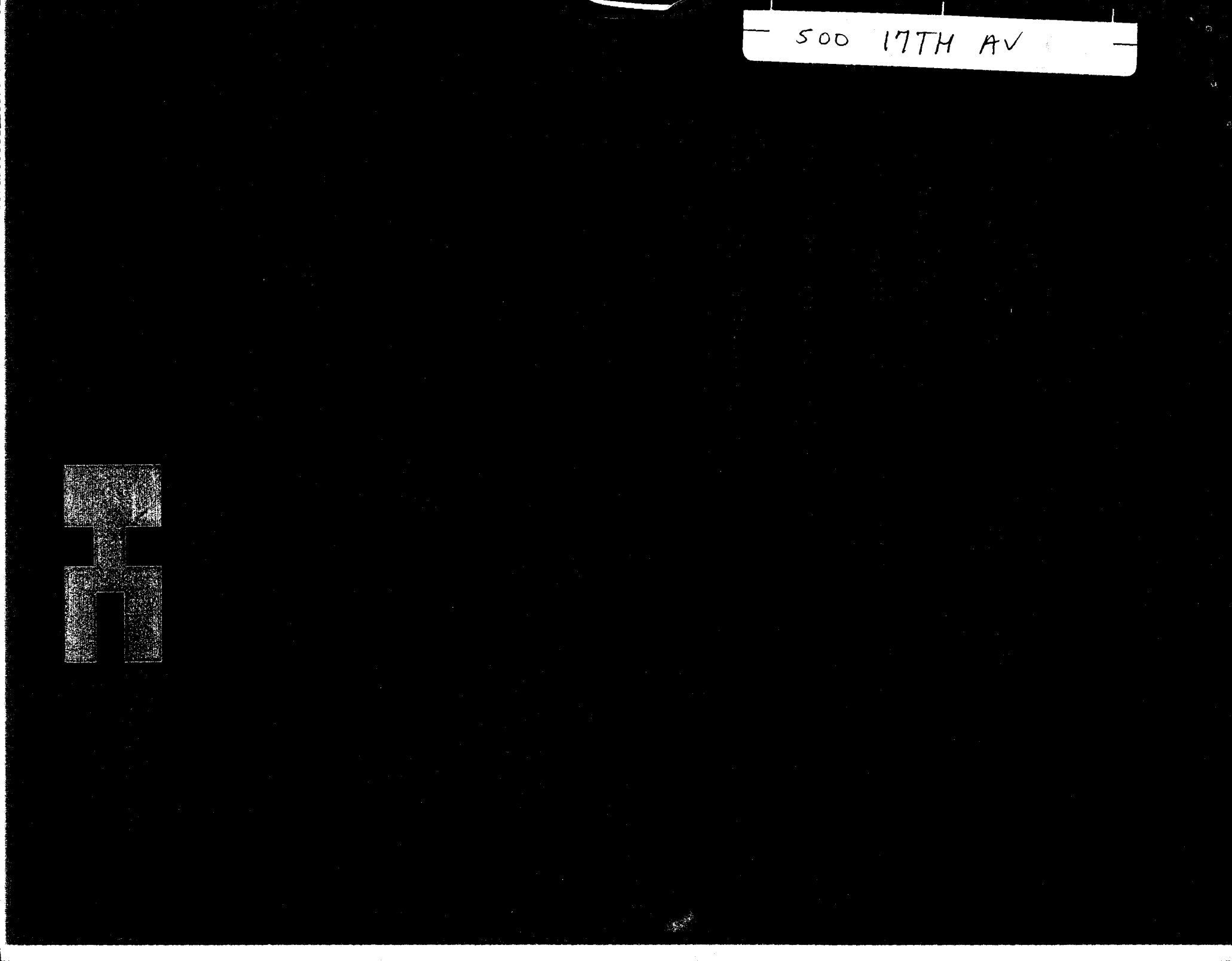
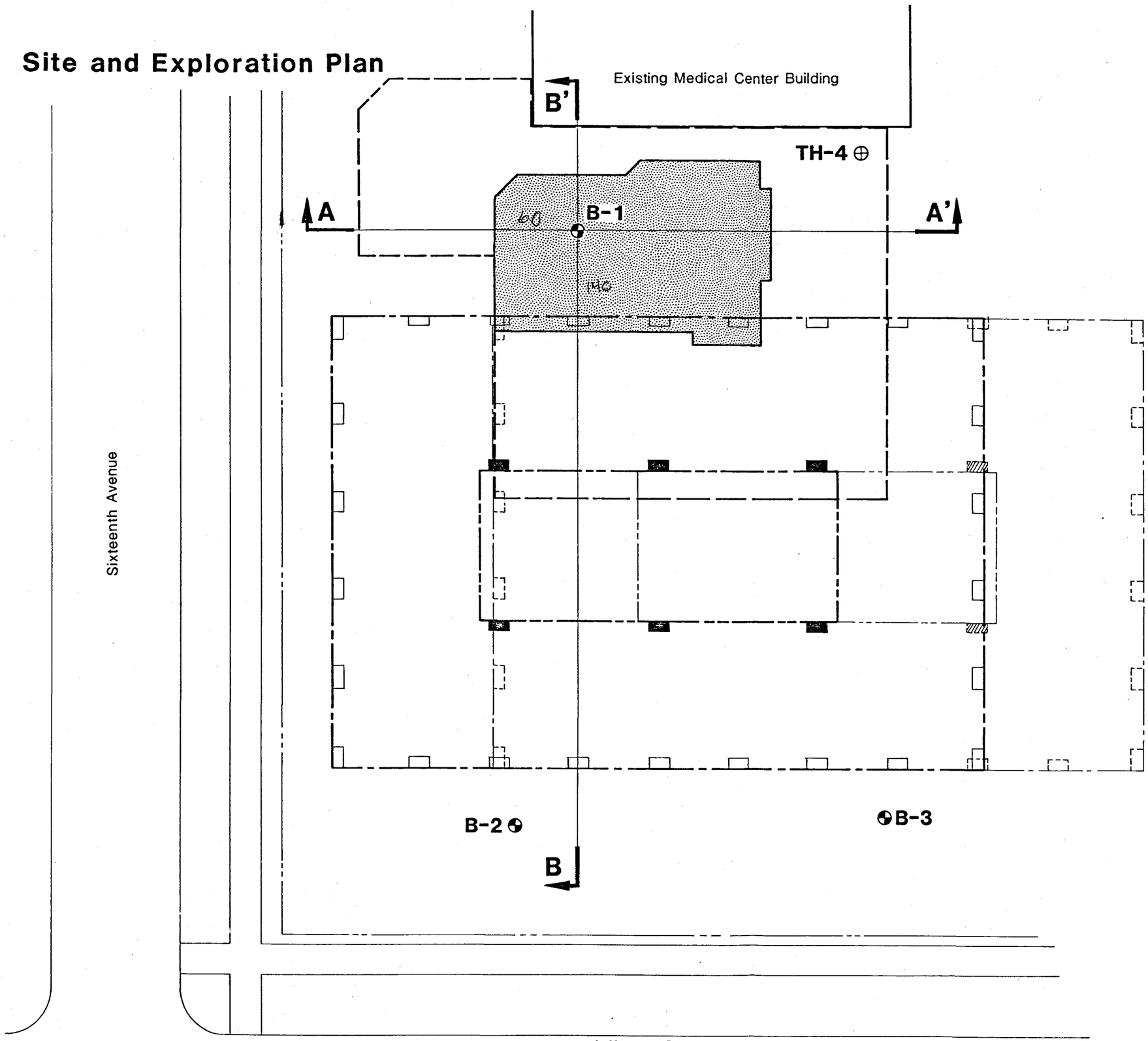
- ☐ Table of Contents
- ☐ Project Location Plan/Map or Vicinity Map
- ☑ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☑ Cross Sections/Subsurface Profiles
- ☐ Fill or Peat Thickness Maps and Contour Maps
- ☑ Boring Logs
- ☑ Geology Text (if no logs)
- ☑ Soil Classification 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 some seismic data
- ☐ Date Copied 7-14-99 By AG

330


500 17TH AV

Site and Exploration Plan



Boring Location and Number

● B-1 Hart-Crowser, 1983

⊕ TH-4 Shannon & Wilson, 1976

Proposed Phase I Linear Accelerator (Below Ground Surface)

Limits of Facility

Slab Location

Proposed Phase II Physicians Office Building

Anticipated Location

Alternative Location

Anticipated Core Location

Alternative Core Location

A A' Cross Section Location and Designation

N

0 20 40

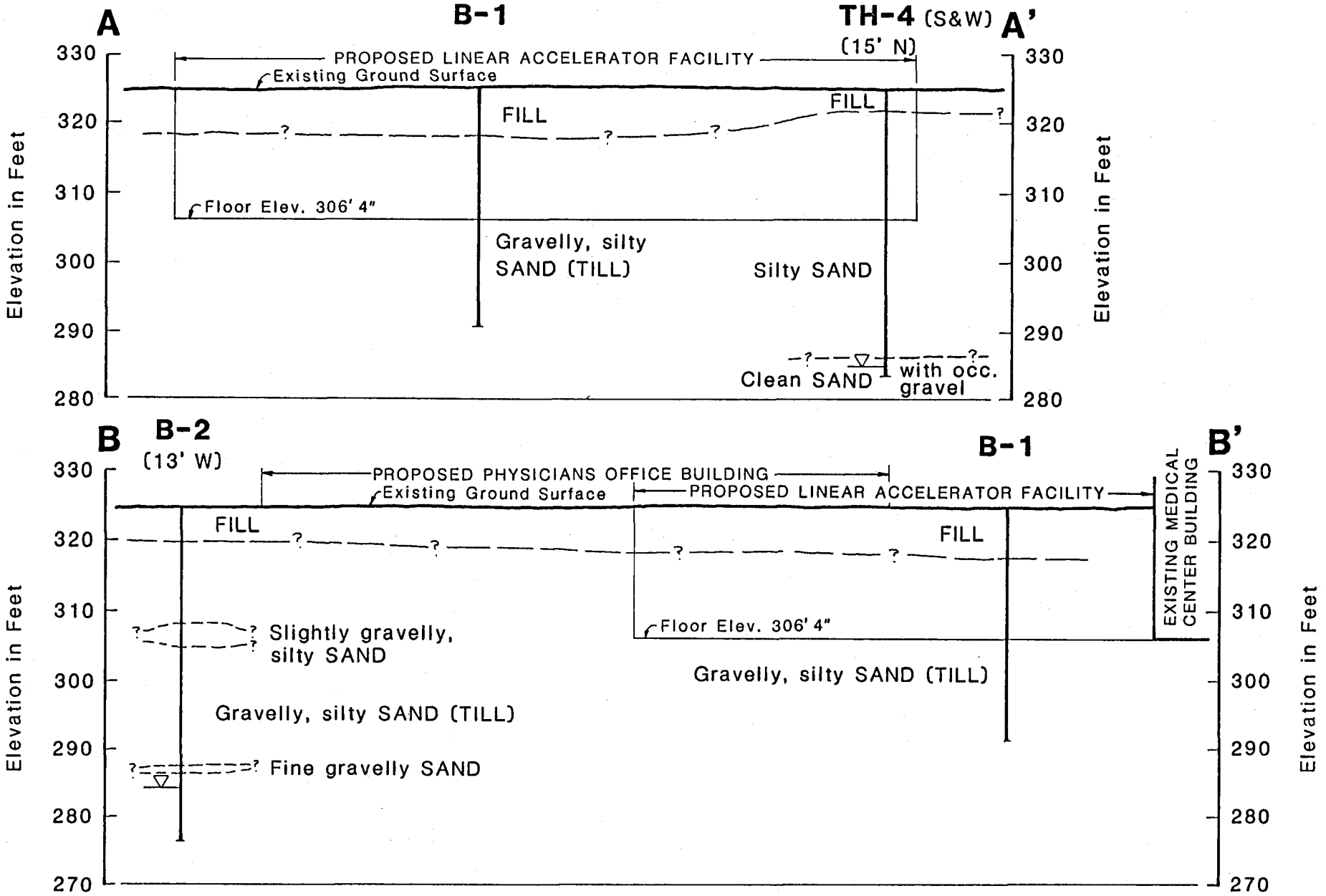
Scale in Feet

J-1253 June 1983

HART-CROWSER & associates inc.

Figure 1

Subsurface Cross Sections A-A' and B-B'



Note: The stratum lines are based upon interpolation between borings and may not represent actual subsurface conditions.
Groundwater levels represent conditions observed on the date shown on the boring logs.

0 20 40
Scale in Feet

J-1253 June 1983
HART-CROWSER & associates inc.
Figure 2

Ground Motion Response Spectra

50 Year Design Life

50 Percent Probability of Exceedence

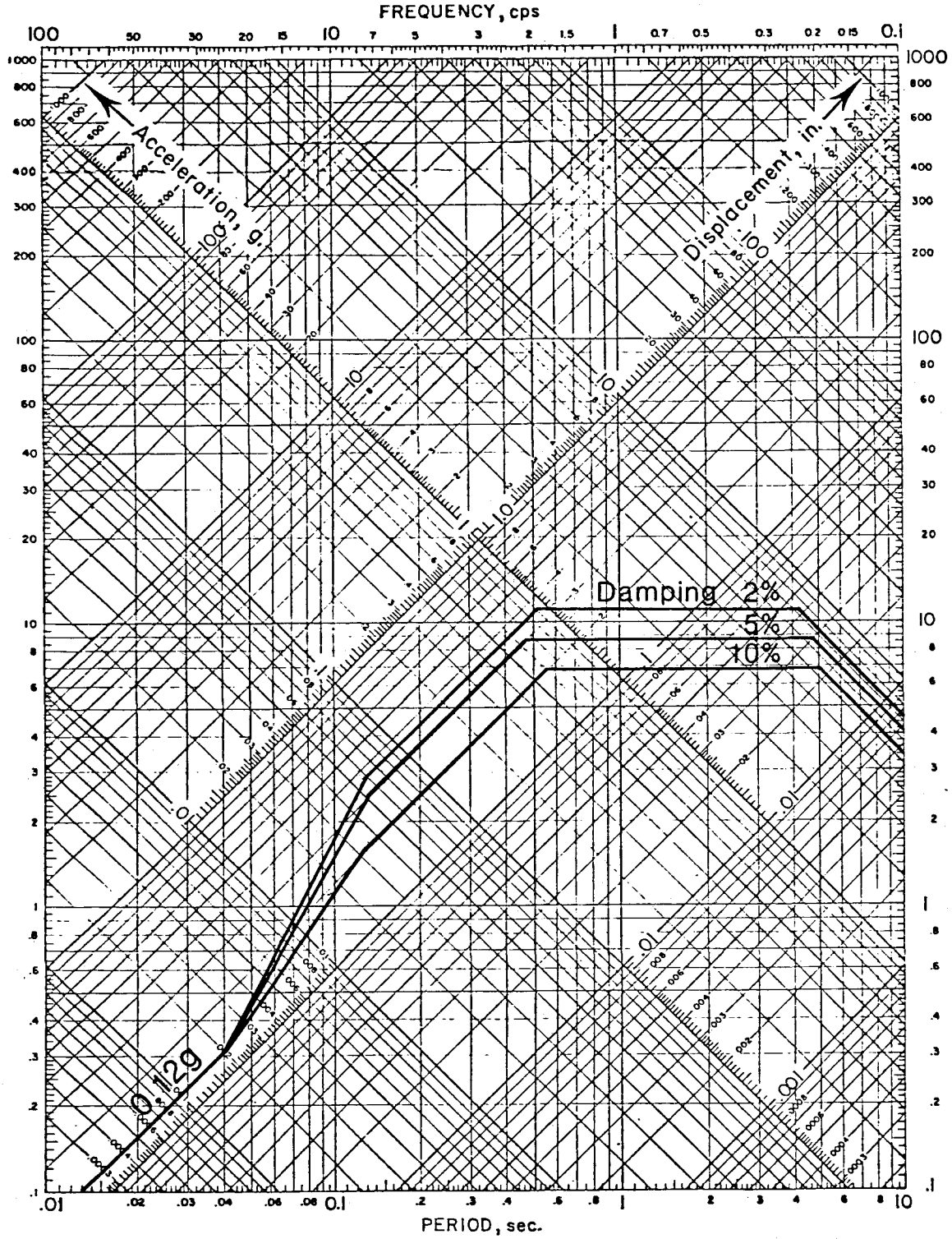


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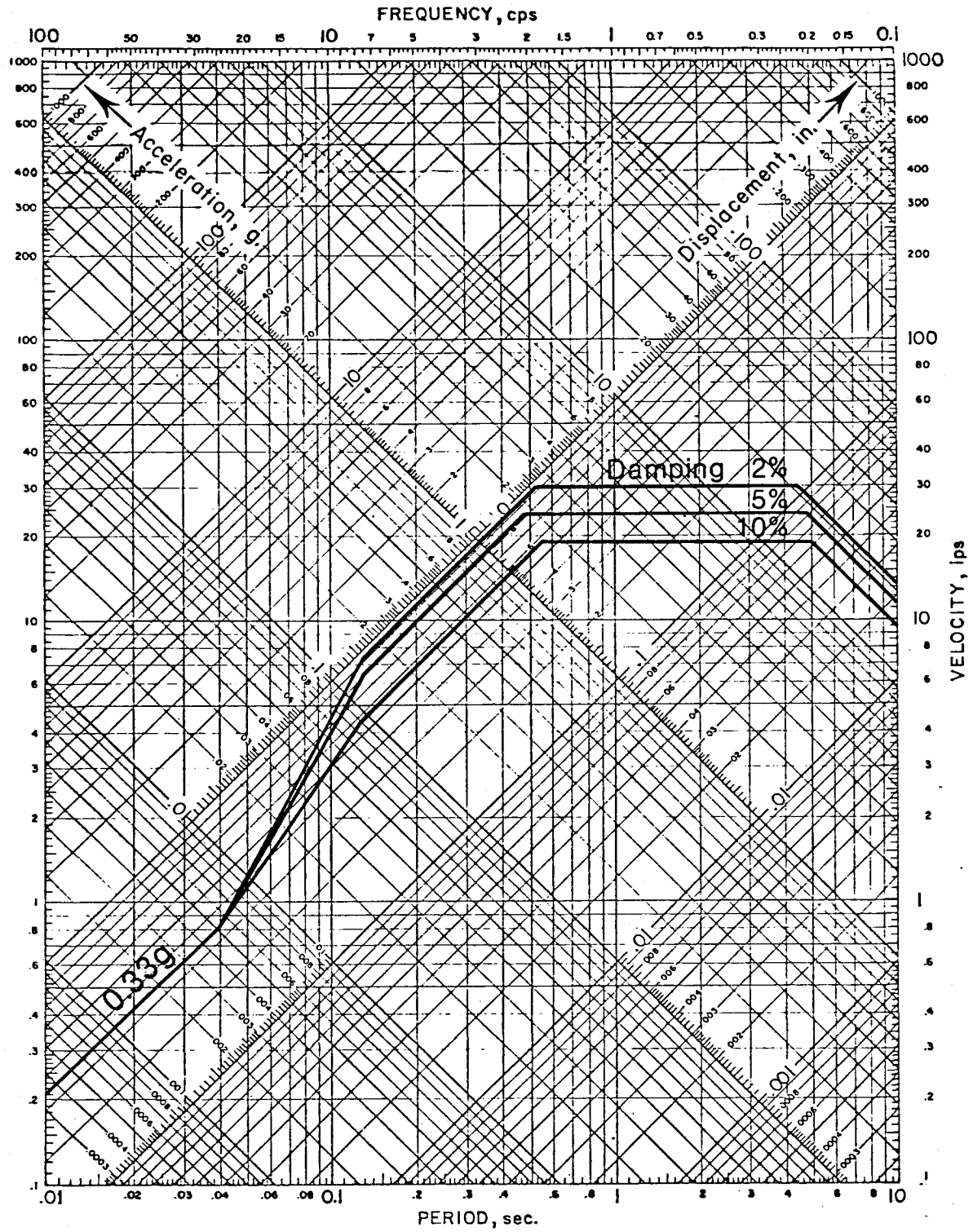
Figure 3

Ground Motion Response Spectra

50 Year Design Life

10 Percent Probability of Exceedence



J-1253 June 1983

HART-CROWSER & associates inc.

Figure 4

Boring Log B-1

SOIL
INTERPRETATION

STANDARD
PENETRATION RESISTANCE
(140 pound weight, 30 inch drop)

LABORATORY
TESTS

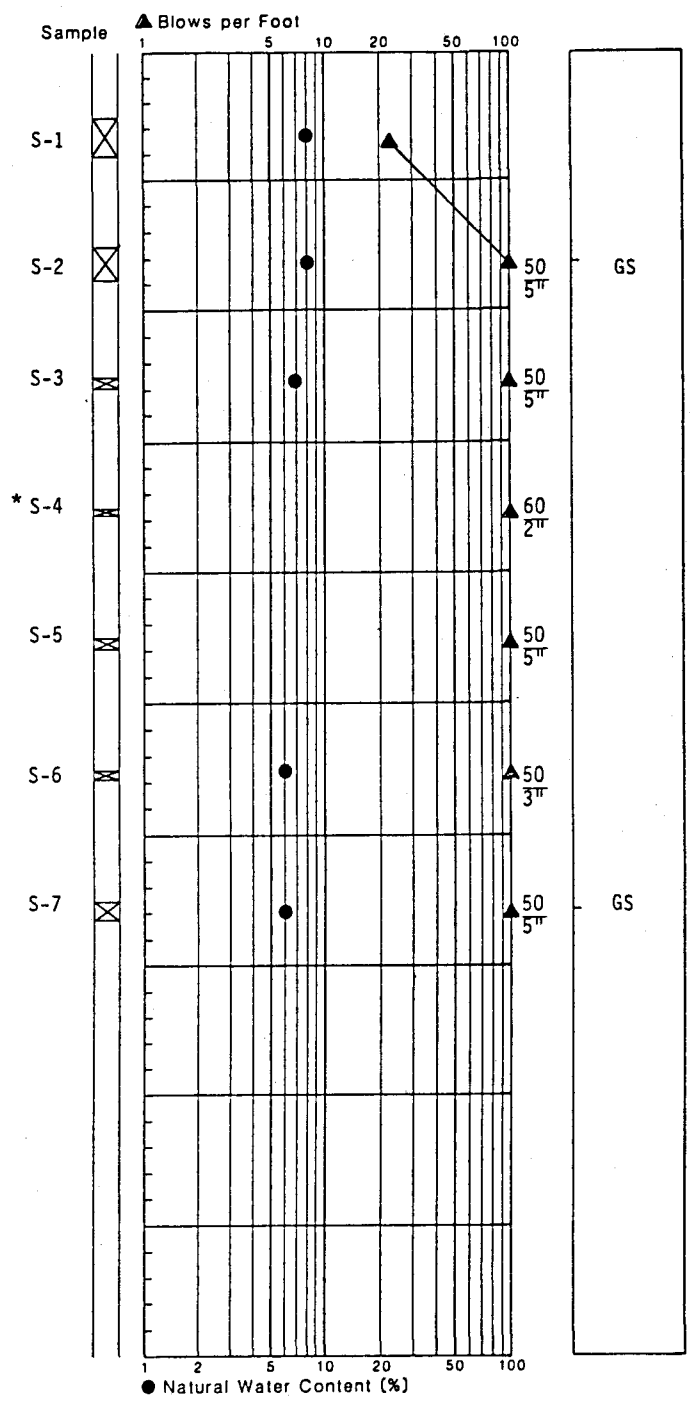
Approximate Ground Surface Elevation in Feet 325

Asphalt concrete pavement.

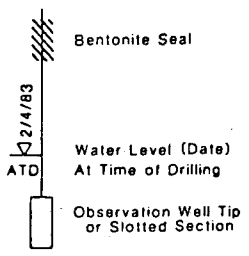
Medium dense, damp, brown, silty, gravelly SAND with numerous fragments of brick (FILL).

Very dense, damp, gray, gravelly, slightly silty to silty SAND (TILL).

Bottom of Boring at 33.4 feet.
Completed 5/20/83.



Groundwater Level



Sampling

- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- Cutting Sample
- * No Sample Recovery

Laboratory Tests

GS	Grain Size Analysis	TUU	Triaxial Unconsolidated Undrained
CN	Consolidation Test	TCU	Triaxial Consolidated Undrained
K	Permeability Test	TCD	Triaxial Consolidated Drained
DS	Direct Shear		
OU	Unconfined Compression, tsf		
TV	Torvane, tsf		
PP	Pocket Penetrometer, tsf		

Water Content (%)

Plastic Limit — Natural Water Content — Liquid Limit

Notes

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level, if indicated, is for the date specified and may vary with the time of year.
3. Blow count for S-5 may be nonrepresentative as the sampler appeared to be bouncing on a rock and very little soil was recovered.

J-1253 May 1983
HART-CROWSER & associates inc.
Figure A-1

Boring Log B-2

SOIL INTERPRETATION

STANDARD PENETRATION RESISTANCE
(140 pound weight, 30 inch drop)

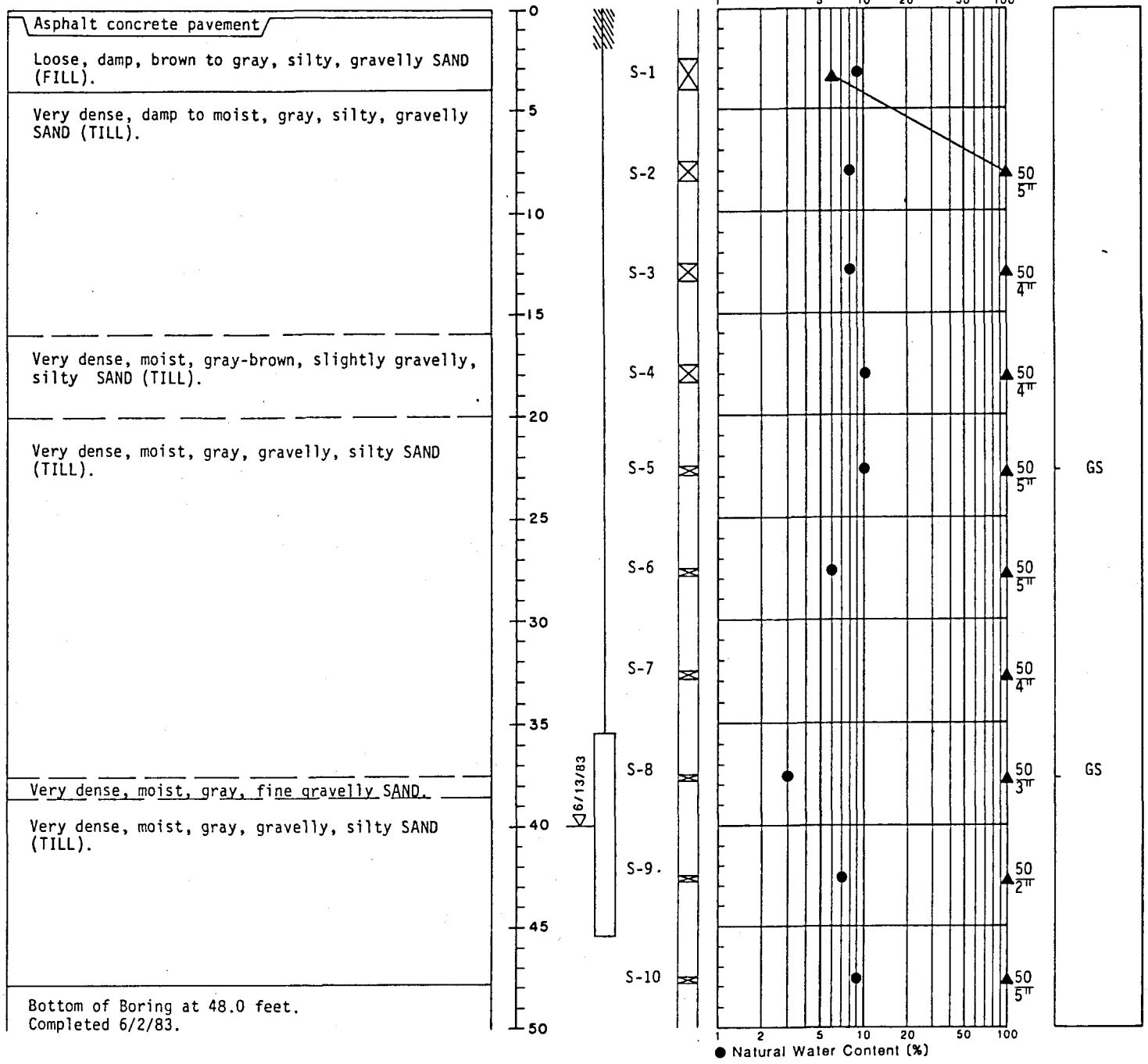
LABORATORY TESTS

Approximate Ground Surface Elevation in Feet 325

Depth Feet

Sample

▲ Blows per Foot



Groundwater Level

- Bentonite Seal
- 2/4/83 ATD — Water Level (Date) At Time of Drilling
- Observation Well Tip or Slotted Section

Sampling

- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- Cutting Sample
- ★ No Sample Recovery

Laboratory Tests

GS	Grain Size Analysis
CN	Consolidation Test
K	Permeability Test
DS	Direct Shear
OU	Unconfined Compression, tsf
TV	Torvane, tsf
PP	Pocket Penetrometer, tsf
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained

Water Content (%)

Plastic Limit — Natural Water Content — Liquid Limit

Notes

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level, if indicated, is for the date specified and may vary with the time of year.
3. No ground water observed at time of drilling.

J-1253 May 1983

HART-CROWSER & associates inc.

Figure A-2

Boring Log B-3

SOIL INTERPRETATION

STANDARD PENETRATION RESISTANCE
(140 pound weight, 30 inch drop)

LABORATORY TESTS

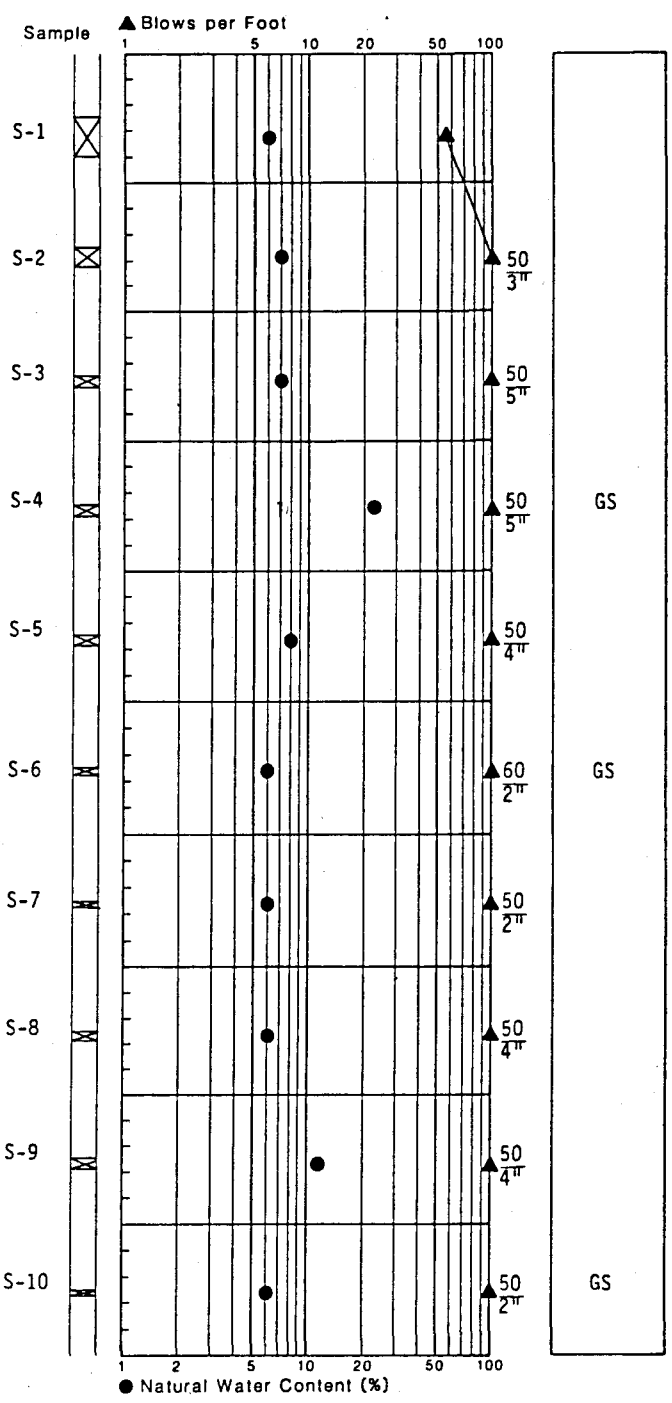
Approximate Ground Surface Elevation in Feet 325

Asphalt concrete pavement.

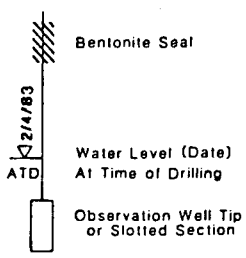
Very dense, damp, brown, slightly silty, gravelly SAND with occasional concrete fragments (FILL).

Very dense, damp to moist, slightly gravelly to gravelly, silty SAND (TILL).

Bottom of Boring at 47.6 feet.
Completed 5/18/83.



Groundwater Level



Sampling

- 2" O.D. Split Spoon Sample
- 3" O.D. Shelby Tube Sample
- Cutting Sample
- ★ No Sample Recovery

Laboratory Tests

GS	Grain Size Analysis
CN	Consolidation Test
K	Permeability Test
DS	Direct Shear
QU	Unconfined Compression, tsf
TV	Torvane, tsf
PP	Pocket Penetrometer, tsf
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained

Water Content (%)

Plastic Limit — Natural Water Content — Liquid Limit

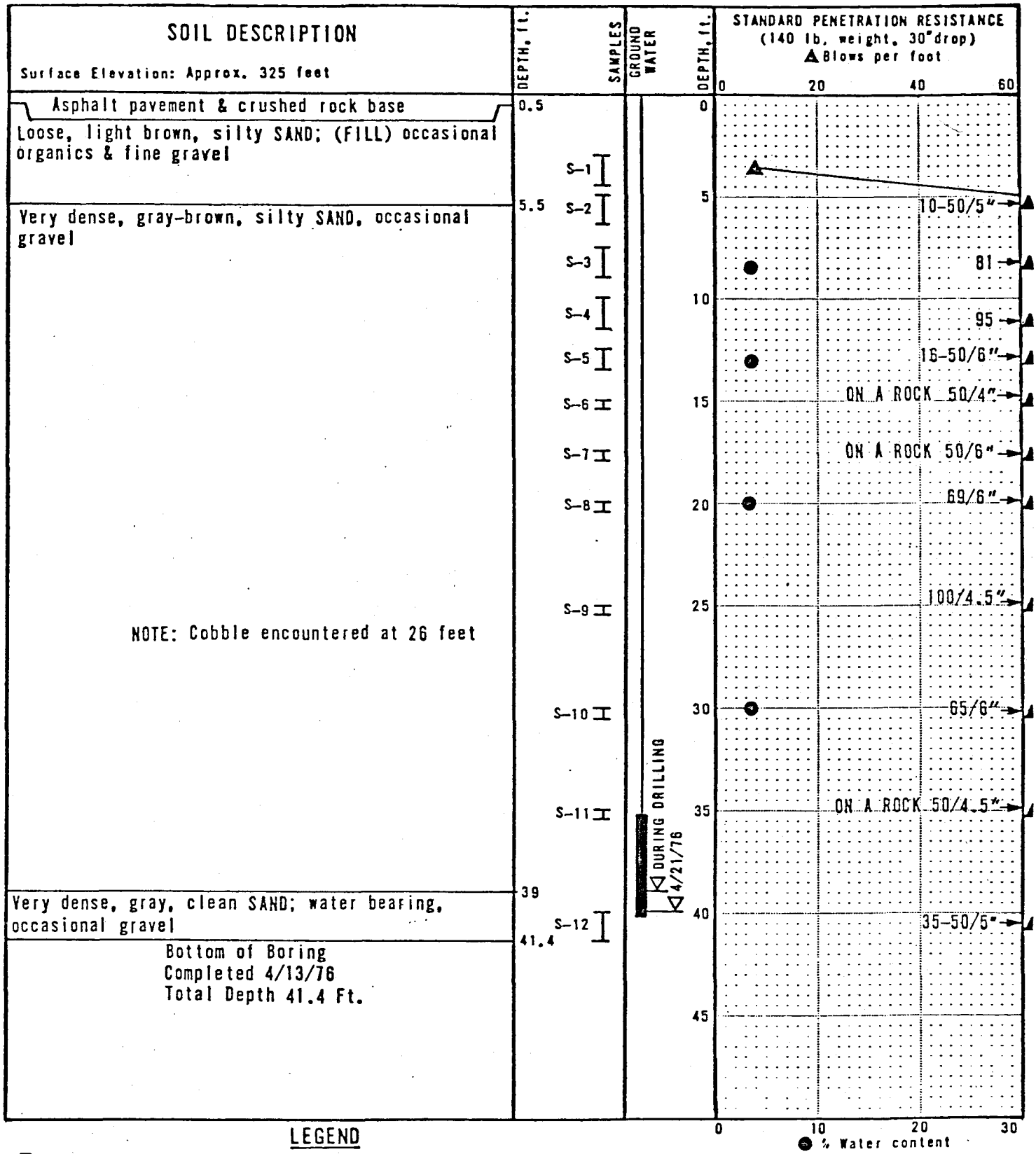
Notes

1. Soil descriptions are interpretive and actual changes may be gradual.
2. Water Level, if indicated, is for the date specified and may vary with the time of year.

J-1253 May 1983
HART-CROWSER & associates inc.
Figure A-3

Boring Log TH-4

(Accomplished by Shannon & Wilson Inc., April, 1976)



LEGEND

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

J-1253 June 1983

HART-CROWSER & associates inc.

Figure A-4

TABLE B-1 Unified Soil Classification System

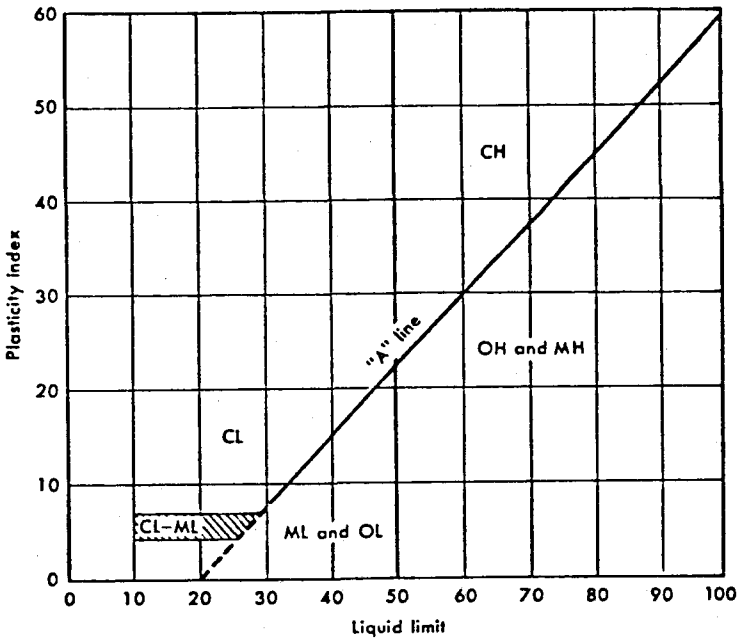
Major divisions			Group symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is larger than No. 200 sieve size) 0.08 mm	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM* d u	Silty gravels, gravel-sand-silt mixtures	Atterburg limits below "A" line or P.I. less than 4
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterburg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM* d u	Silty sands, sand-silt mixtures	Atterburg limits below "A" line or P.I. less than 4
			SC	Clayey sands, sand-clay mixtures	Atterburg limits above "A" line with P.I. greater than 7
Fine-grained soils (More than half of material is smaller than No. 200 sieve) 0.08 mm	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		Pt	Peat and other highly organic soils	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 per cent ..... GW, GP, SW, SP
More than 12 per cent ..... GM, GC, SM, SC
5 to 12 per cent ..... Borderline cases requiring dual symbols**

Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols

Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.

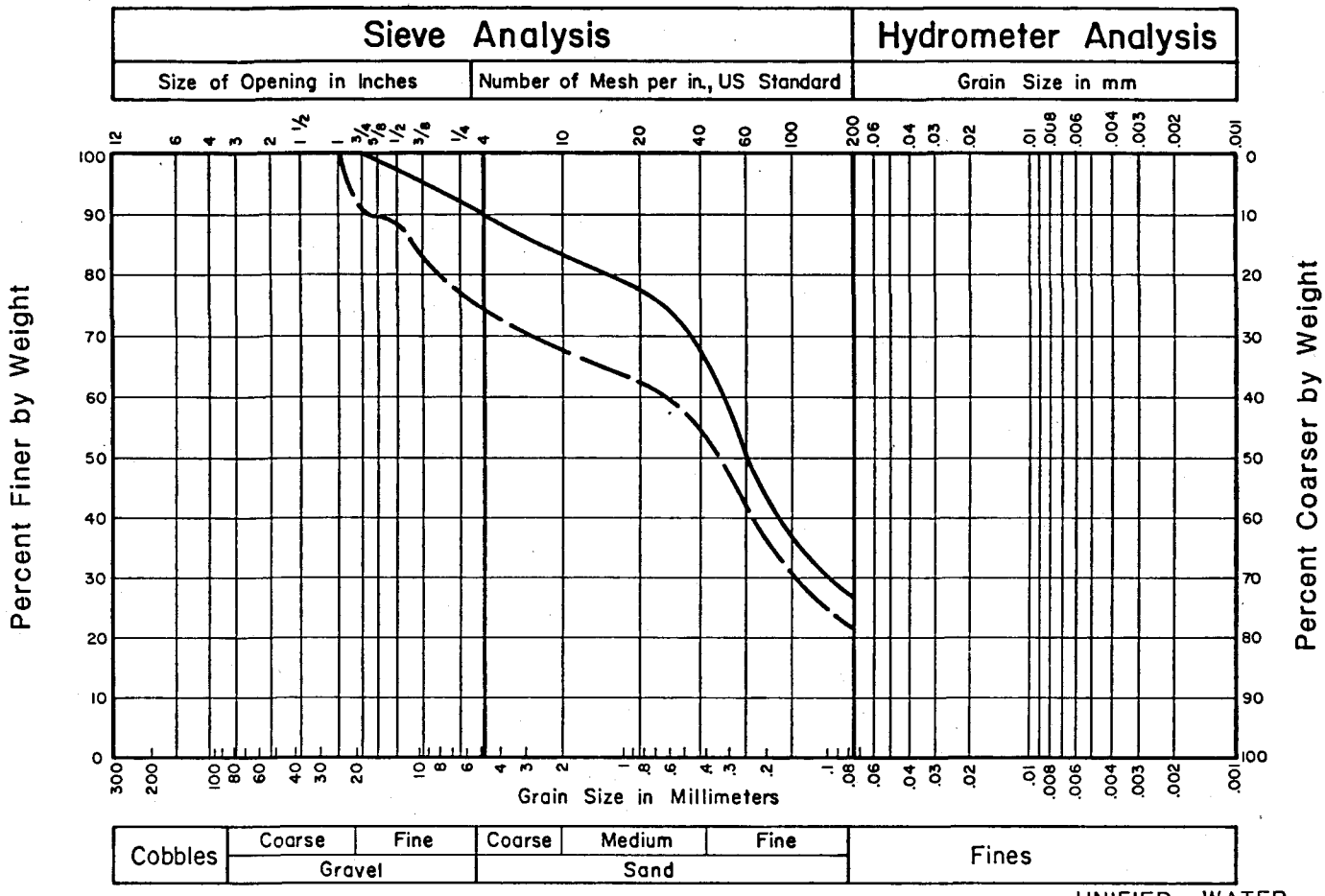


Plasticity Chart

*Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterburg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28

**Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example: GW-GC, well-graded gravel-sand mixture with clay binder.

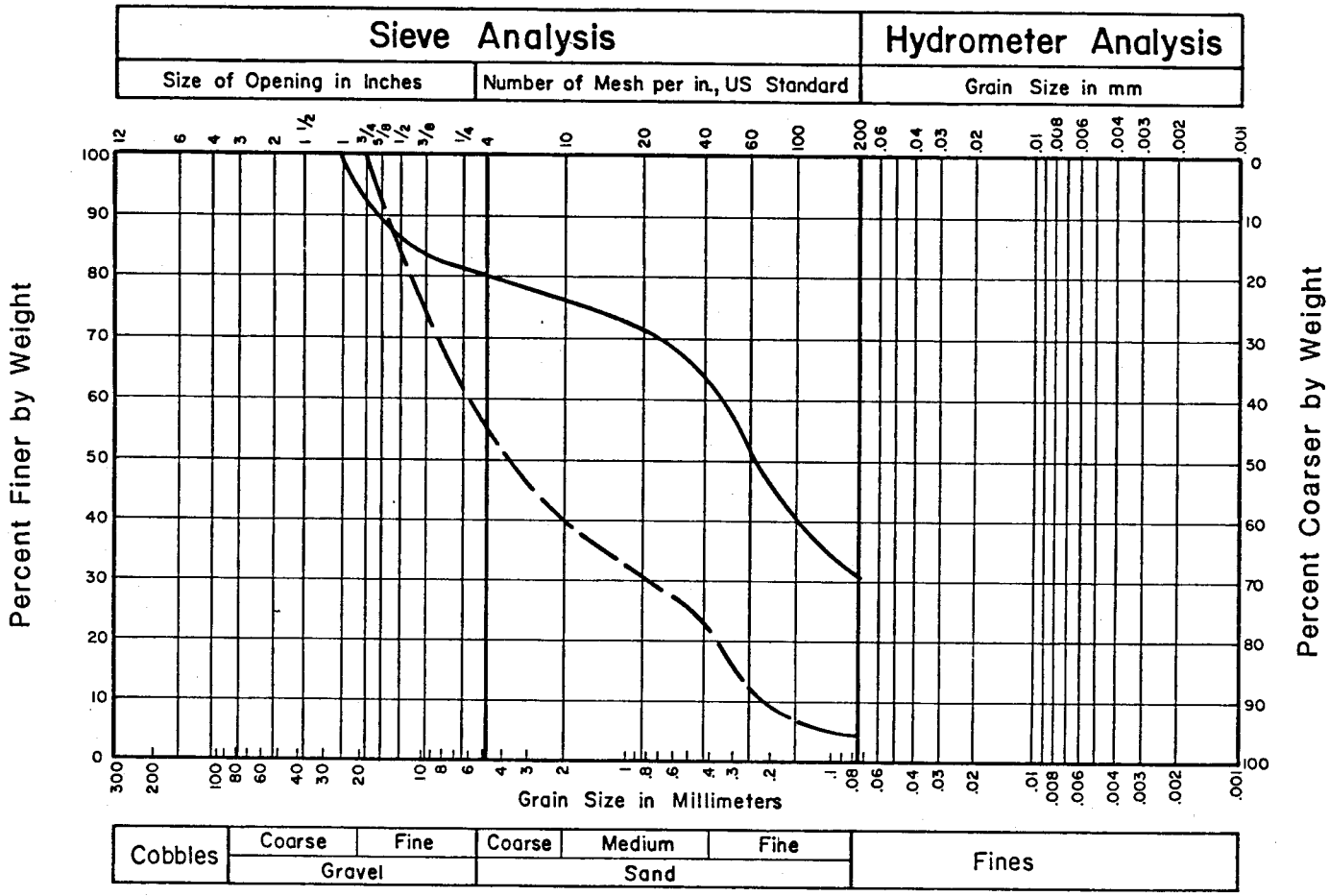
Grain Size Classification



LINE SYMBOL	BORING NUMBER	SAMPLE NUMBER	DEPTH IN FEET	CLASSIFICATION	UNIFIED SOIL CLASS.	WATER CONTENT PERCENT
———	B-1	S-2	7.5-9.0	Slightly gravelly, silty SAND	SM	8
— — —	B-1	S-7	32.5-33.4	Silty, gravelly SAND	SM	7

J-1253 June 1983
HART-CROWSER & associates, inc.
Figure B-1

Grain Size Classification



LINE SYMBOL	BORING NUMBER	SAMPLE NUMBER	DEPTH IN FEET	CLASSIFICATION	UNIFIED SOIL CLASS.	WATER CONTENT PERCENT
———	B-2	S-5	22.5-23.0	Gravelly, silty SAND	SM	10
— — —	B-2	S-8	37.5-37.8	Very gravelly SAND	SP	3

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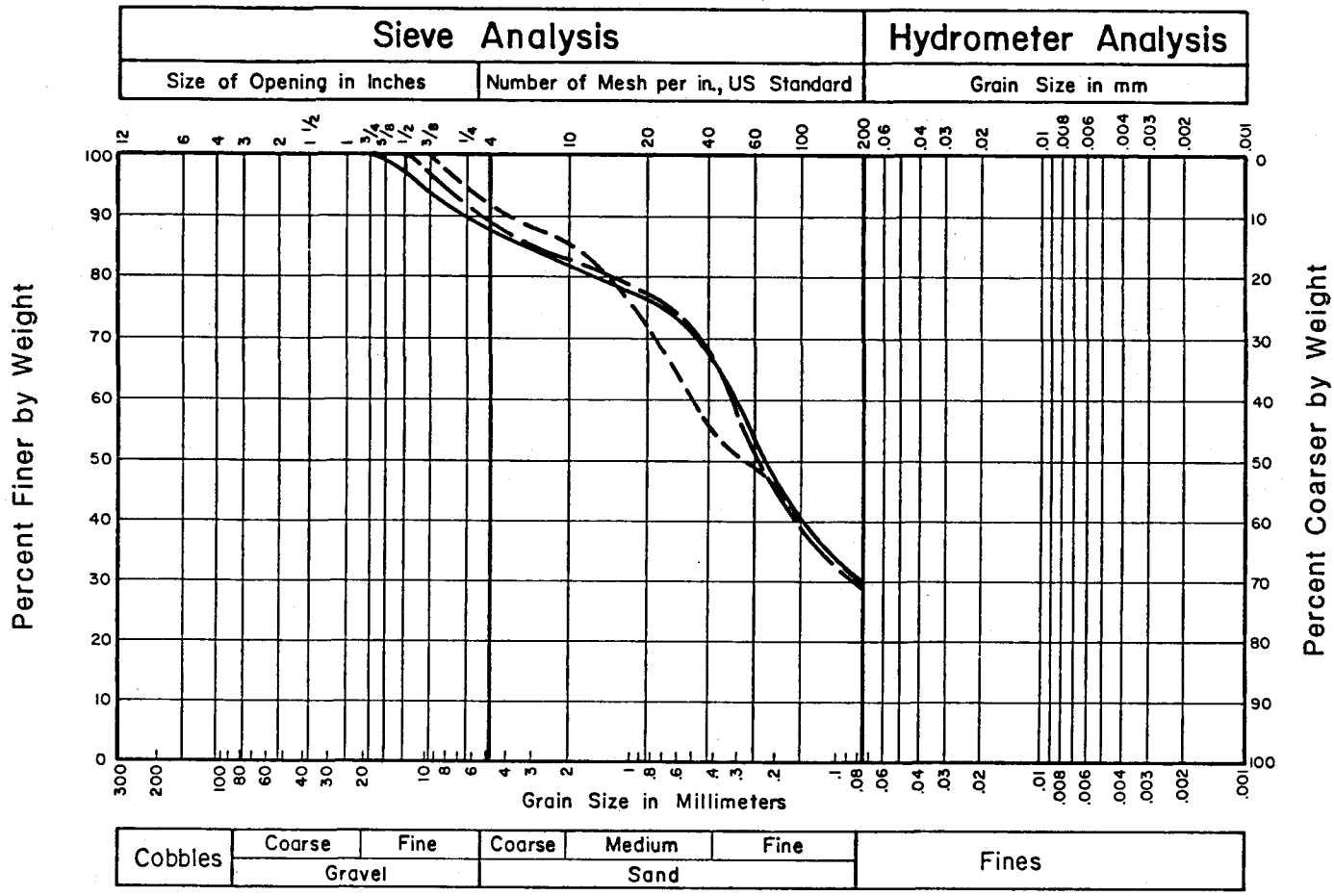
HART-CROWSER & associates, inc.
Figure B-2

Grain Size Classification



LINE SYMBOL	BORING NUMBER	SAMPLE NUMBER	DEPTH IN FEET	CLASSIFICATION	UNIFIED SOIL CLASS.	WATER CONTENT PERCENT
———	B-3	S-4	17.5-17.9	Slightly gravelly, silty SAND	SM	23
— — —	B-3	S-6	27.5-27.6	Slightly gravelly, silty SAND	SM	7
— — — — —	B-3	S-10	47.5-47.6	Slightly gravelly, silty SAND	SM	7

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HART-CROWSER & associates, inc.
Figure B-3

TABLE C-1- MODIFIED MERCALLI INTENSITY SCALE
(Abridged from Wood and Neumann, 1931)

I. Not felt except by a very few under especially favorable circumstances.

II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.

III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.

IV. During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls made creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.

V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles, and other tall objects sometimes noticed. Pendulum clocks may stop.

VI. Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.

VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbed persons driving motor cars.

IX. Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

X. Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.

XI. Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII. Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

See (Wood and Neumann, 1931) for complete details of this intensity scale.

Estimated Cumulative Distribution for Intensity

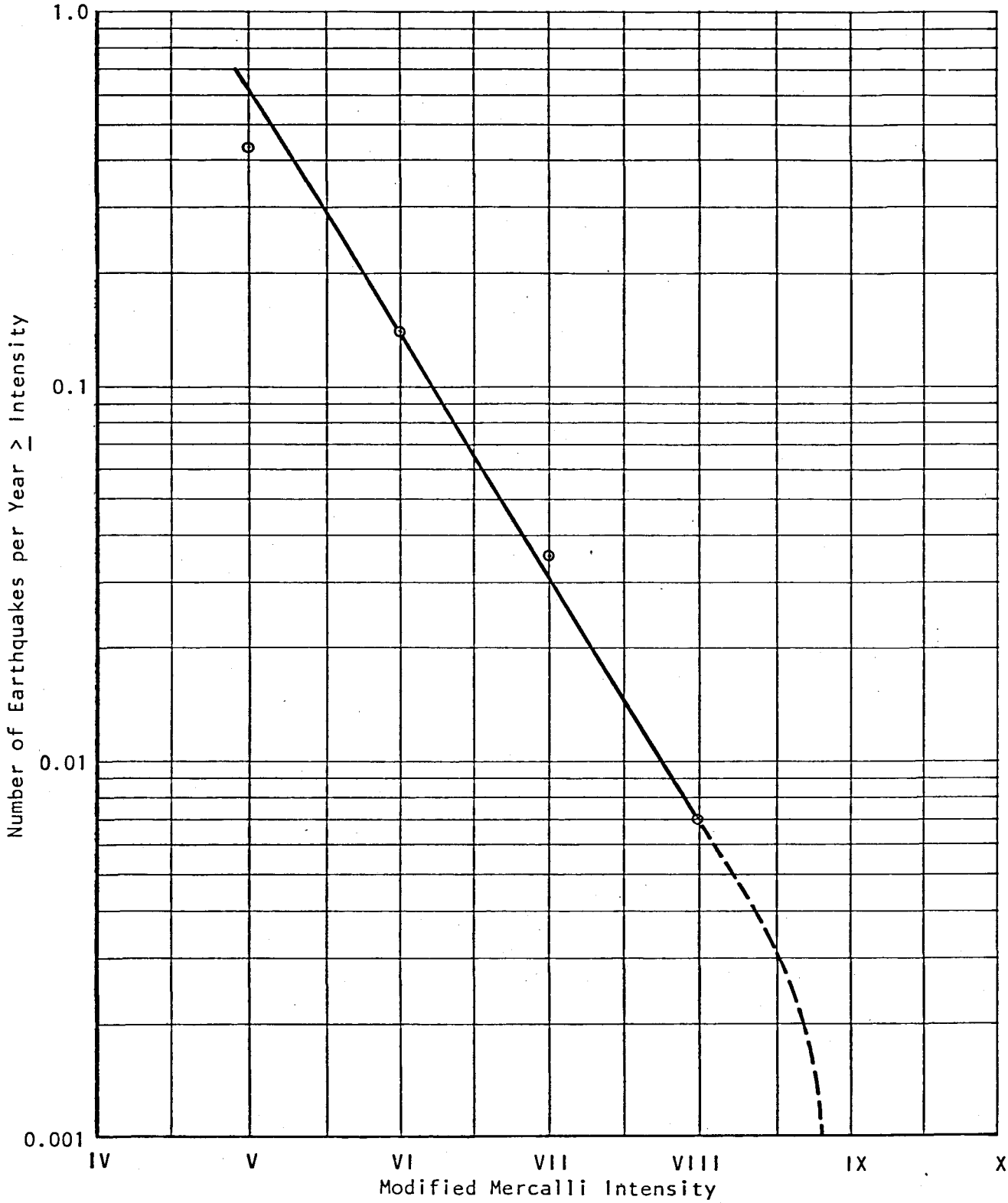

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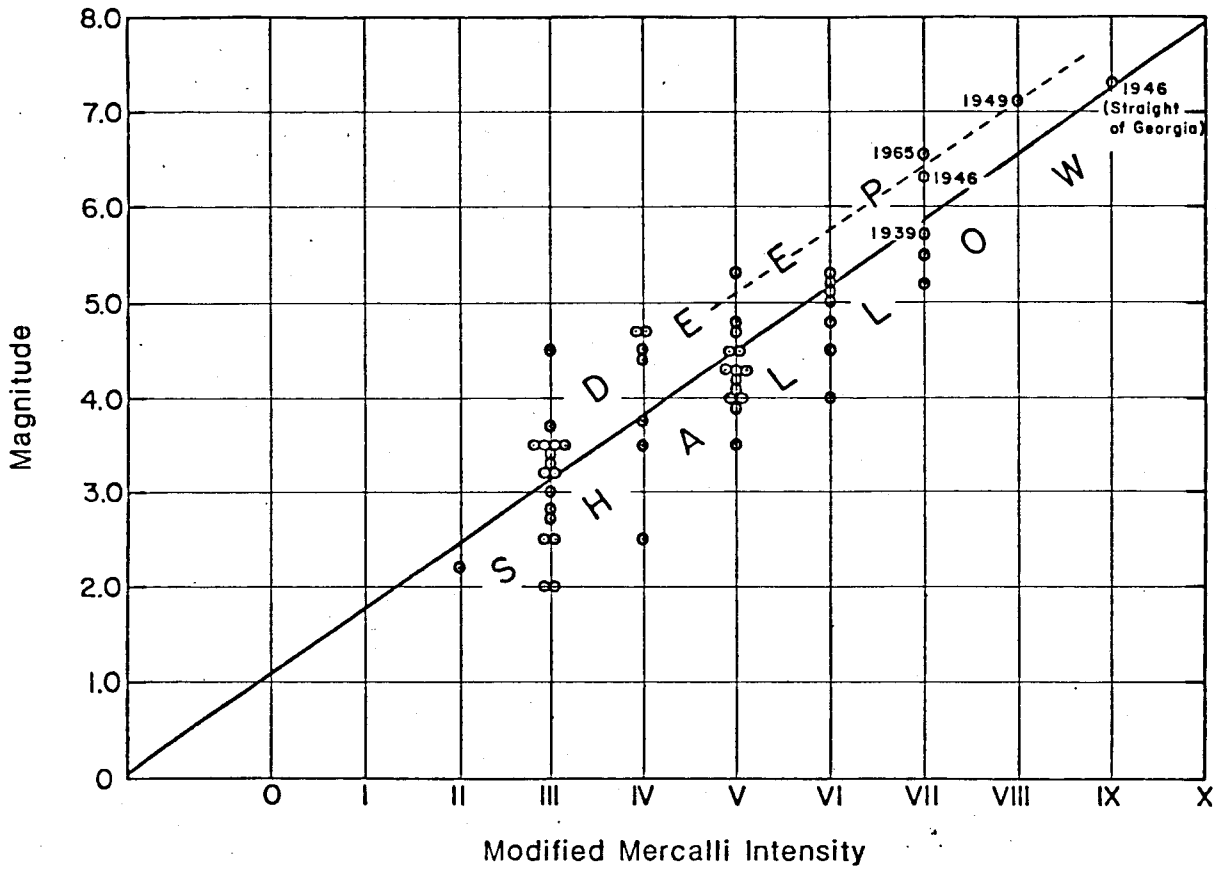
Figure C-1

Magnitude vs Intensity for the Puget Sound Basin



(Adapted from Rasmussen, Millard, Smith, 1974)

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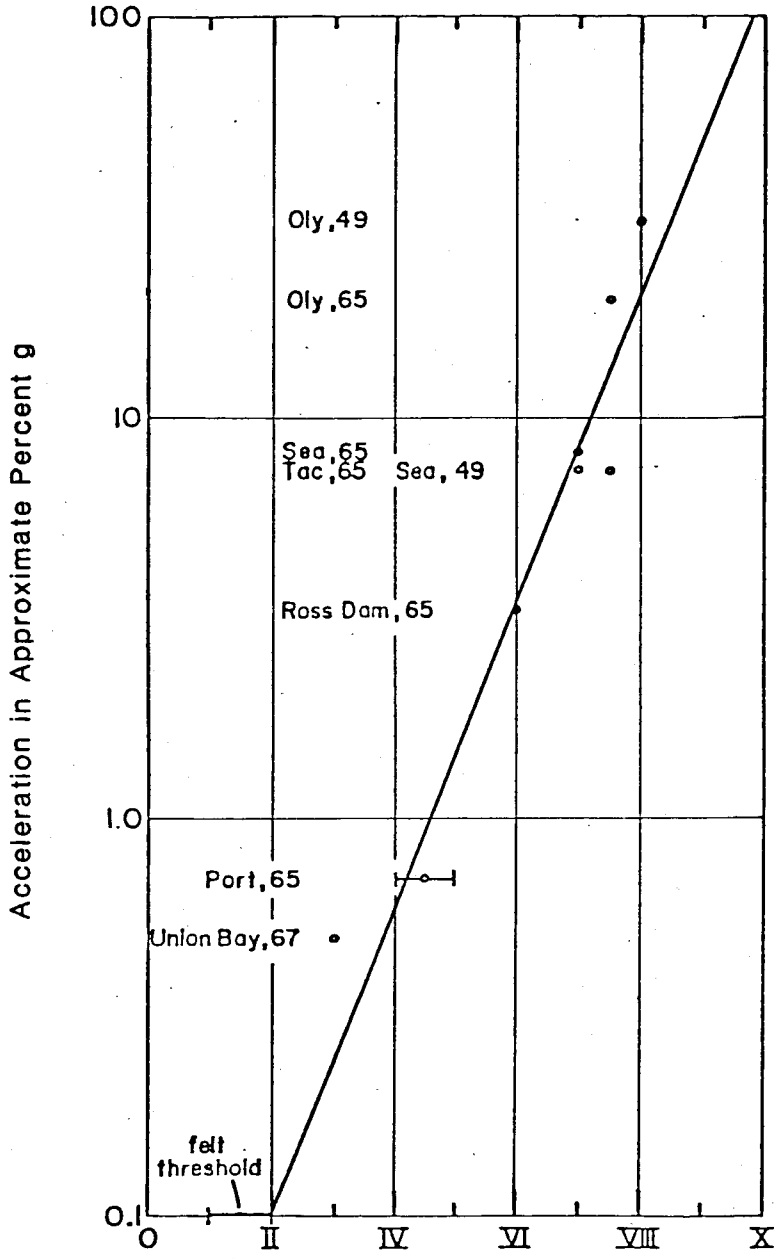
Figure C-2

Acceleration vs Intensity for the Puget Sound Basin



(Adapted from Rasmussen, Millard, Smith, 1974)

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Figure C-3

Estimated Cumulative Distribution for Acceleration

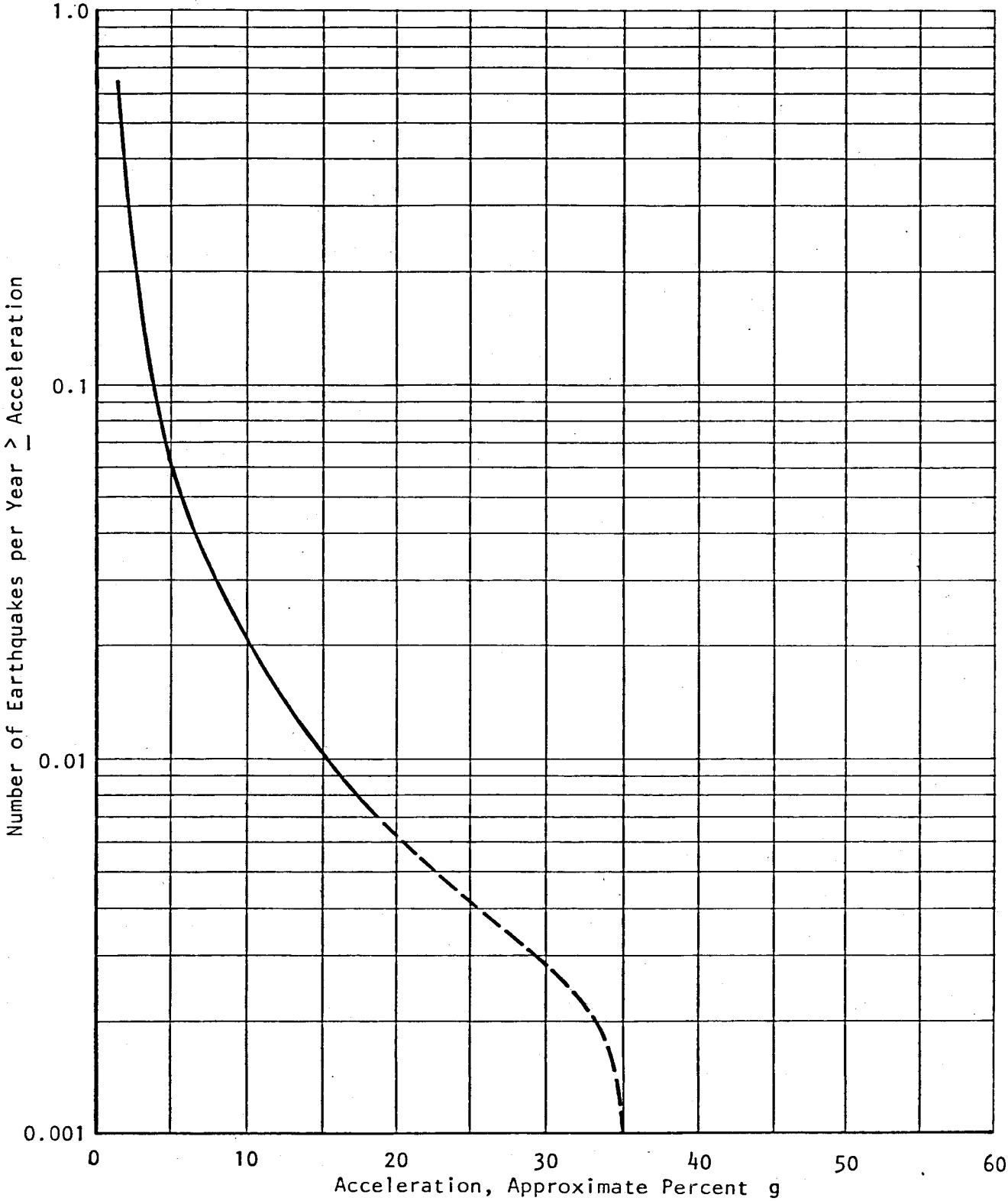

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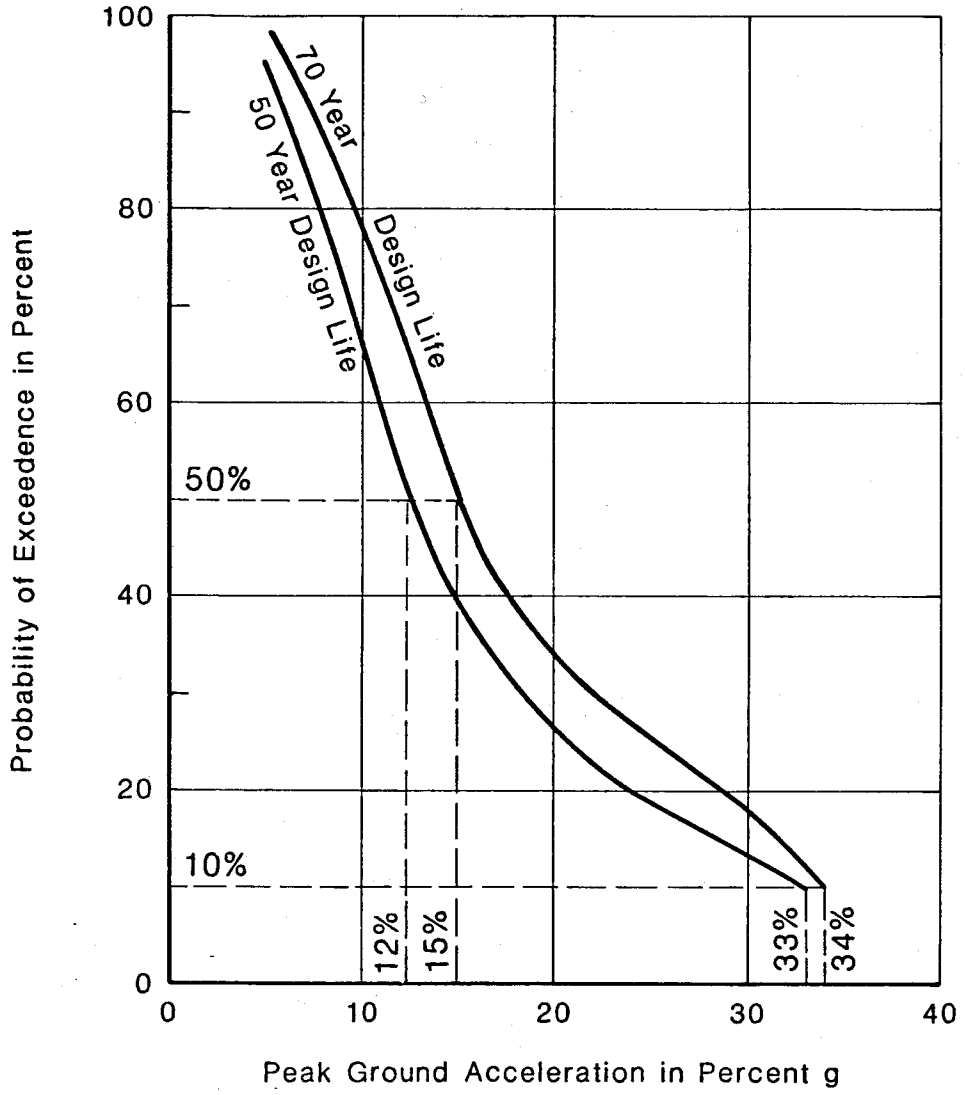
Figure C-4

Probability of Exceedence Relationship for Peak Ground Acceleration vs Design Life



J-1253 June 1983
HART-CROWSER & associates inc.
Figure C-5

- ☐ City box number 16th - 19th Ave
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☐ Report Date
  - ☐ Project name
  - ☑ Company's job number
  - ☑ 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)
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  - ☐ 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_____

  _____
- ☐ Date Copied 7-14-99 By AB

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331

Earth and Environmental Technologies

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1 - 500 17TH AV

4/4

Geotechnical Engineering Design Report
Providence Hospital — East Tower
Seattle, Washington

J-2071

FARID'S FILE

HARTCROWSER

Earth and Environmental Technologies

Geotechnical Engineering Design Report
Providence Hospital — East Tower
Seattle, Washington

Prepared for
NBBJ and
Providence Medical Center

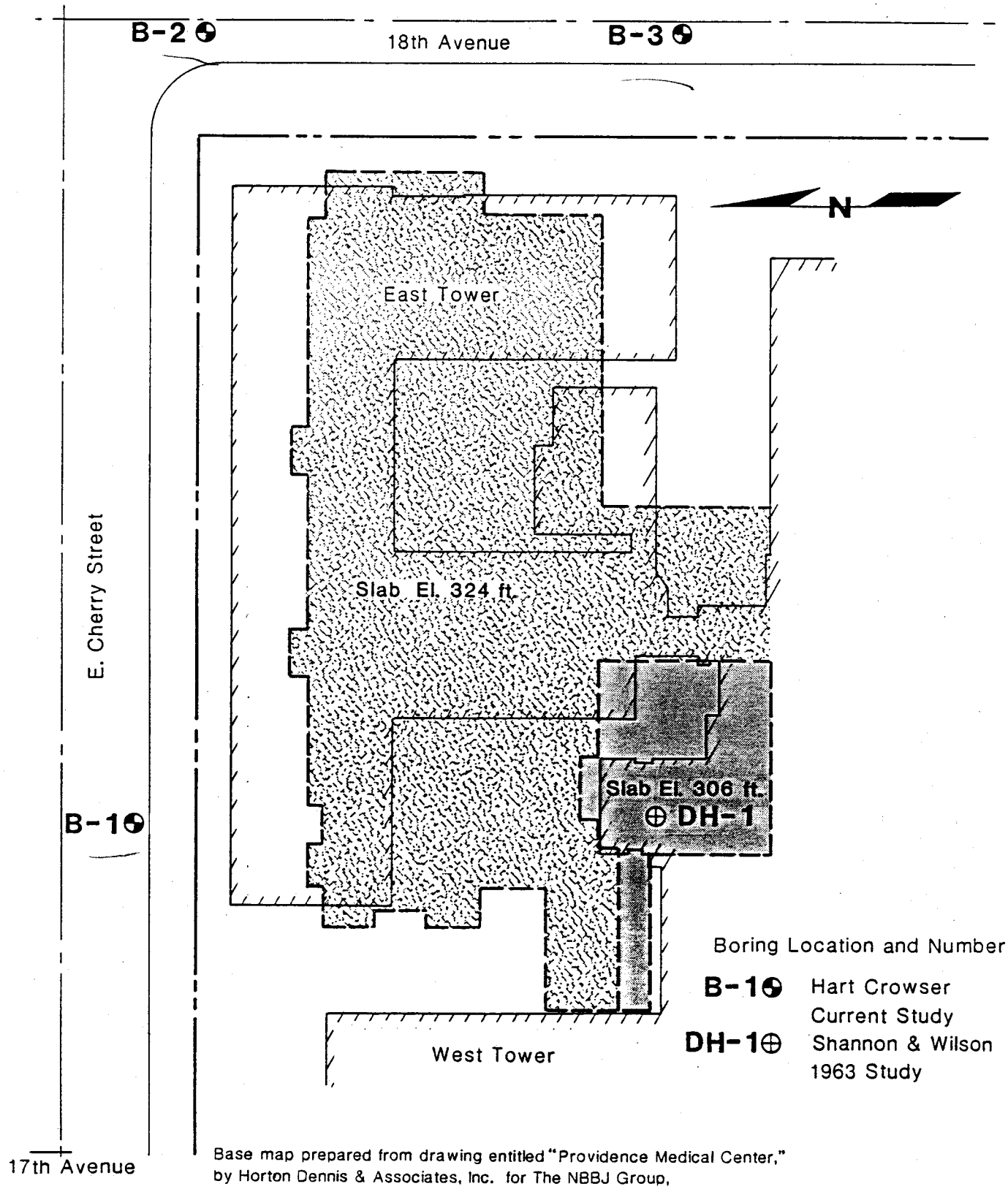
February 5, 1988
J-2071

1910 Fairview Avenue East Seattle, Washington 98102-3699 206.324.9530

J-2071

CONTENTS

Site and Exploration Plan



Base map prepared from drawing entitled "Providence Medical Center," by Horton Dennis & Associates, Inc. for The NBBJ Group, dated December 4, 1987.

0 40 80

Scale in Feet

HARTCROWSER

J-2071 1/88

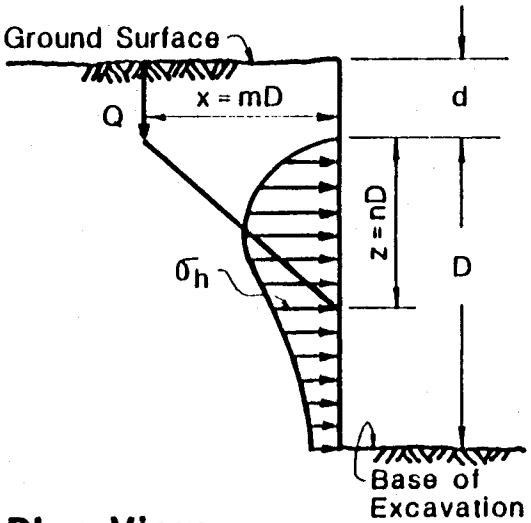
Figure 1

Surcharge Pressures

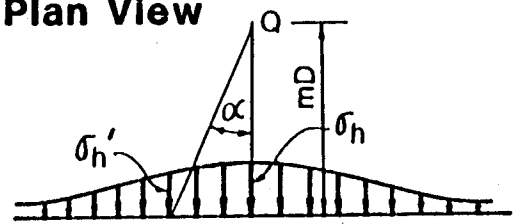
Determination of Lateral Pressure Acting on Adjacent Walls Due to:

A. Small Isolated Footing

Cross Section View



Plan View



$$\sigma_h' = \sigma_h \cos^2(1.1\alpha)$$

(For $m > 0.4$)

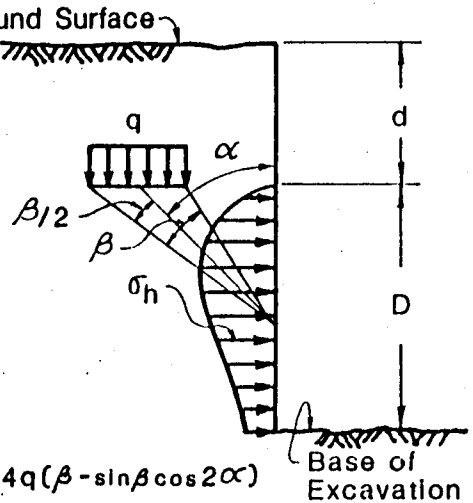
$$\sigma_h = \frac{1.77Q}{D^2}\,\frac{m^2 n^2}{(m^2+n^2)^3}$$

(For $m \leq 0.4$)

$$\sigma_h = \frac{0.28Q}{D^2}\,\frac{n^2}{(0.16+n^2)^3}$$

B. Wide Continuous Footing

Cross Section View



$$\sigma_h = 0.64q(\beta - \sin\beta\cos 2\alpha)$$

Definitions and Units

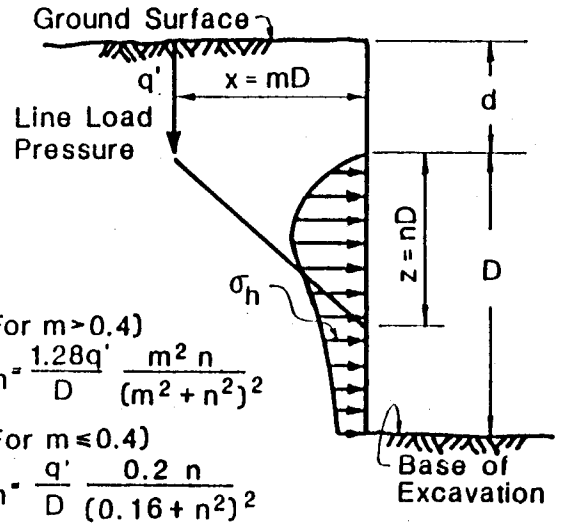
- Q Footing Load in Pounds
- D Excavation Depth below Footing in Feet
- d Depth to Base of Footing in Feet
- σ_h Lateral Soil Pressure in PSF
- q Unit Loading Pressure in PSF
- q' Unit Line Loading Pressure in Pounds per Foot
- α, β Radians

General Notes

1. Lateral Soil Pressures due to adjacent structure should be added to At Rest Lateral Pressures.
2. See text for area of application.
3. Wall footings acting other than parallel to the excavation or large isolated footings can be treated as series of discrete point loads, using approach A.

C. Continuous Wall Footing Parallel to Excavation

Cross Section View



(For $m > 0.4$)

$$\sigma_h = \frac{1.28q'}{D}\,\frac{m^2 n}{(m^2+n^2)^2}$$

(For $m \leq 0.4$)

$$\sigma_h = \frac{q'}{D}\,\frac{0.2\,n}{(0.16+n^2)^2}$$

D. Uniform Area Load

$$\sigma_h = 0.5q$$

q Uniform Pressure in PSF

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J-2071 1/88

Figure 4

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

BORING SAMPLES

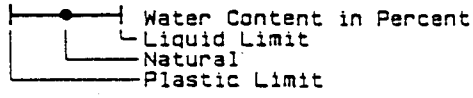
- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

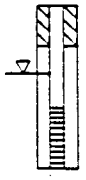
- Grab (Jar)
- Bag
- Shelby Tube

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits



Ground Water Observations



- Surface Seal
- Ground Water Level on Date (ATD) At Time of Drilling
- Observation Well Tip or Slotted Section
- Ground Water Seepage (Test Pits)

J-2071 January 1988
HART-CROWSER & associates, inc.
Figure A-1

Boring Log B-1

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet 346

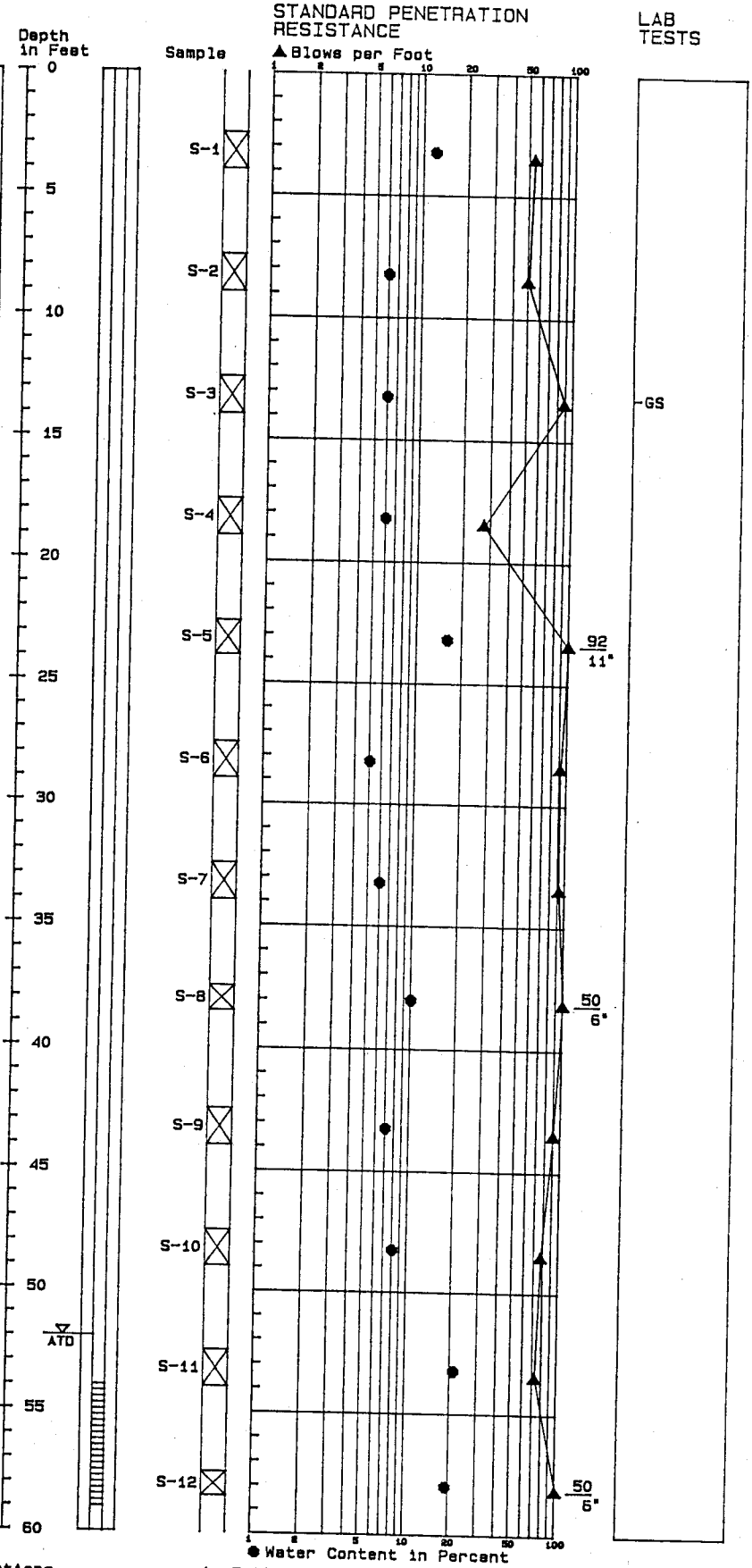
Very dense, moist, gray-brown, silty fine to medium SAND with occasional gravel.

- Grades damp.

- Reddish-brown.

- Wet, sample heave.

Bottom of Boring at 60.0 Feet.
Completed 11/23/87.



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2071 November 1987

HART-CROWSER & associates, inc.

Figure A-2

Boring Log B-2

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet 353

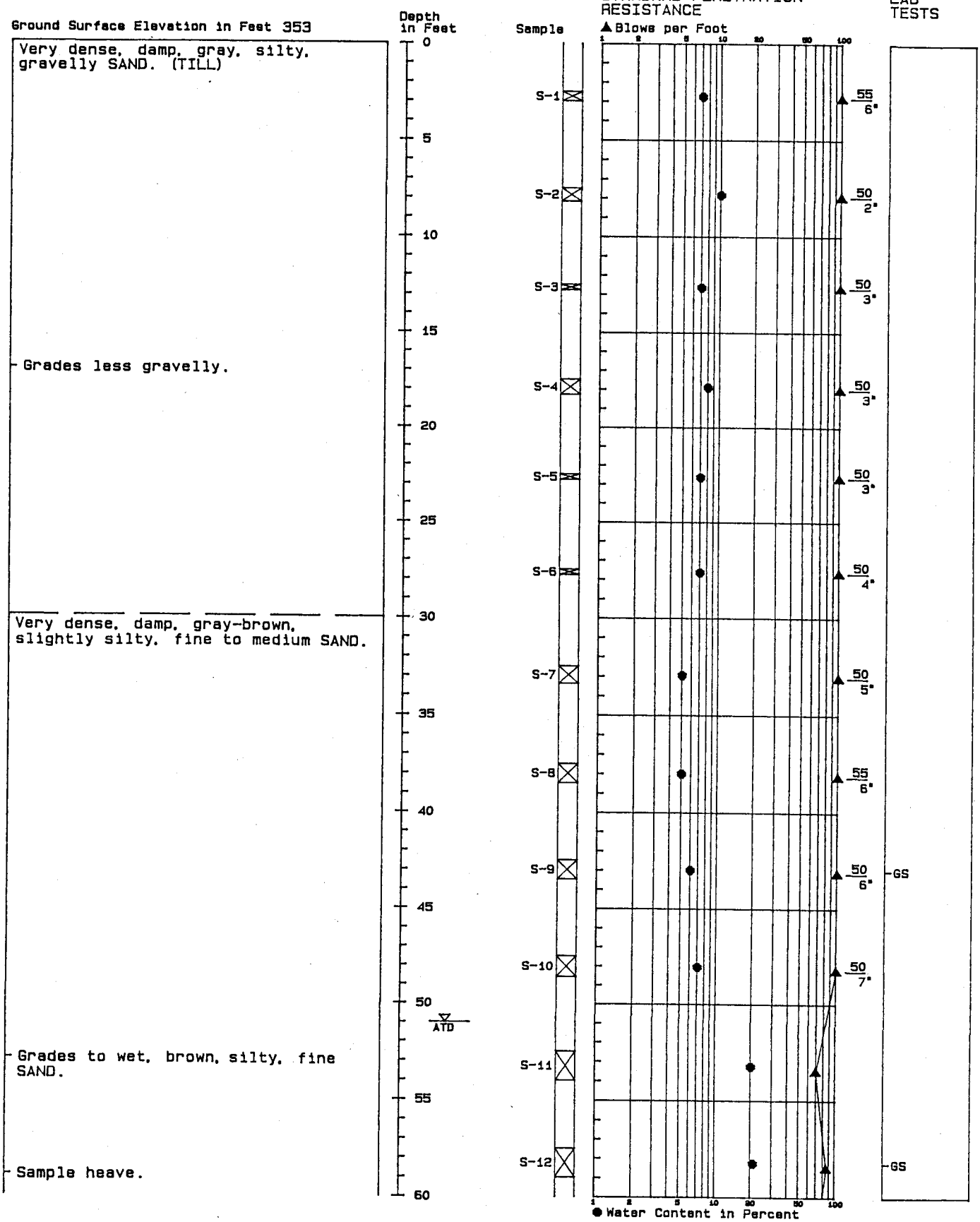
Very dense, damp, gray, silty, gravelly SAND. (TILL)

Grades less gravelly.

Very dense, damp, gray-brown, slightly silty, fine to medium SAND.

Grades to wet, brown, silty, fine SAND.

Sample heave.



J-2071 November 1987

HART-CROWSER & associates, inc.

Sheet 1 of 2 Figure A-3

Boring Log B-2

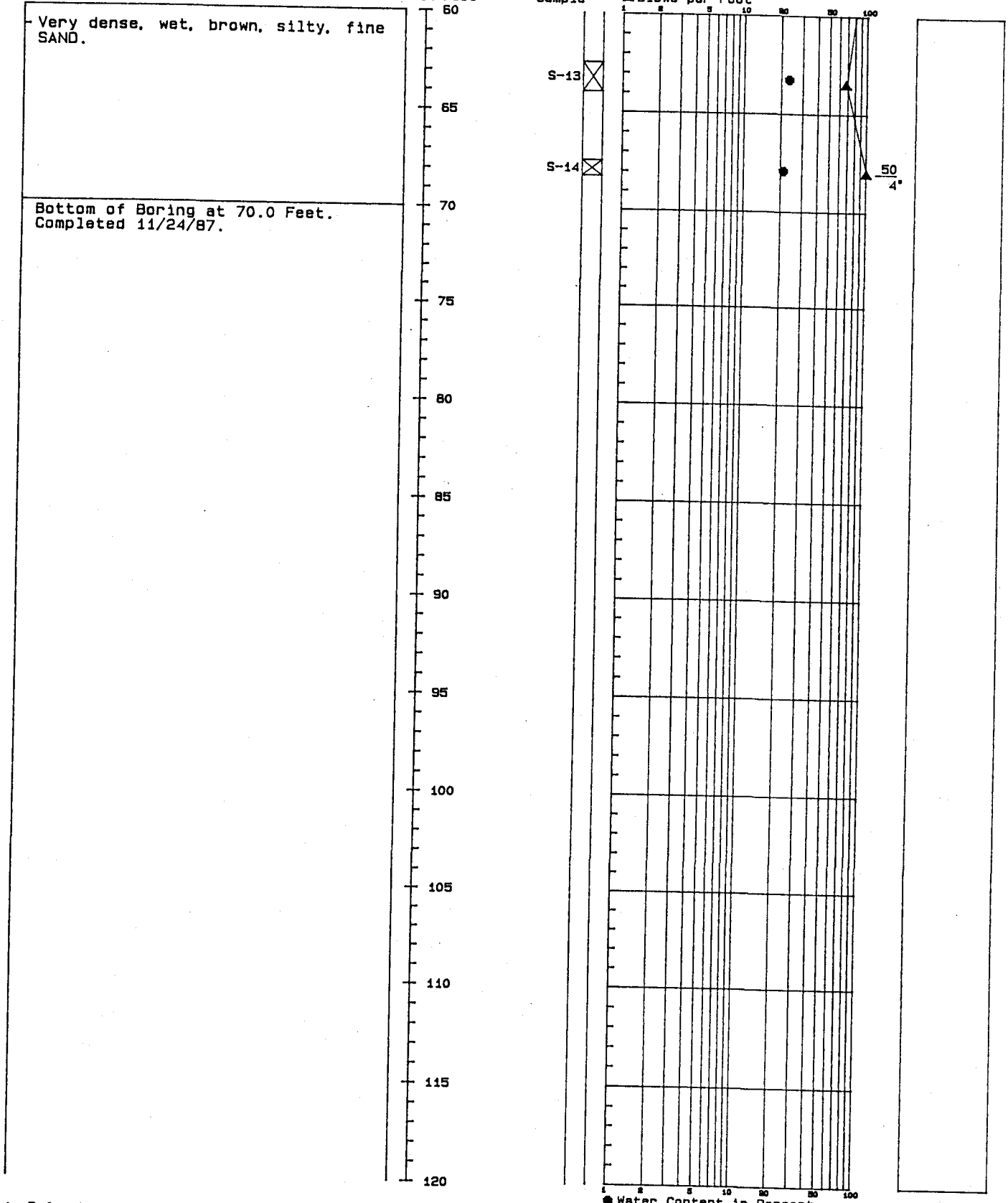
SOIL DESCRIPTIONS

Ground Surface Elevation in Feet 353

Depth in Feet

- Very dense, wet, brown, silty, fine SAND.

Bottom of Boring at 70.0 Feet.
Completed 11/24/87.



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2071 November 1987
HART-CROWSER & associates, inc.
Sheet 2 of 2 Figure A-3

Boring Log B-3

SOIL DESCRIPTIONS

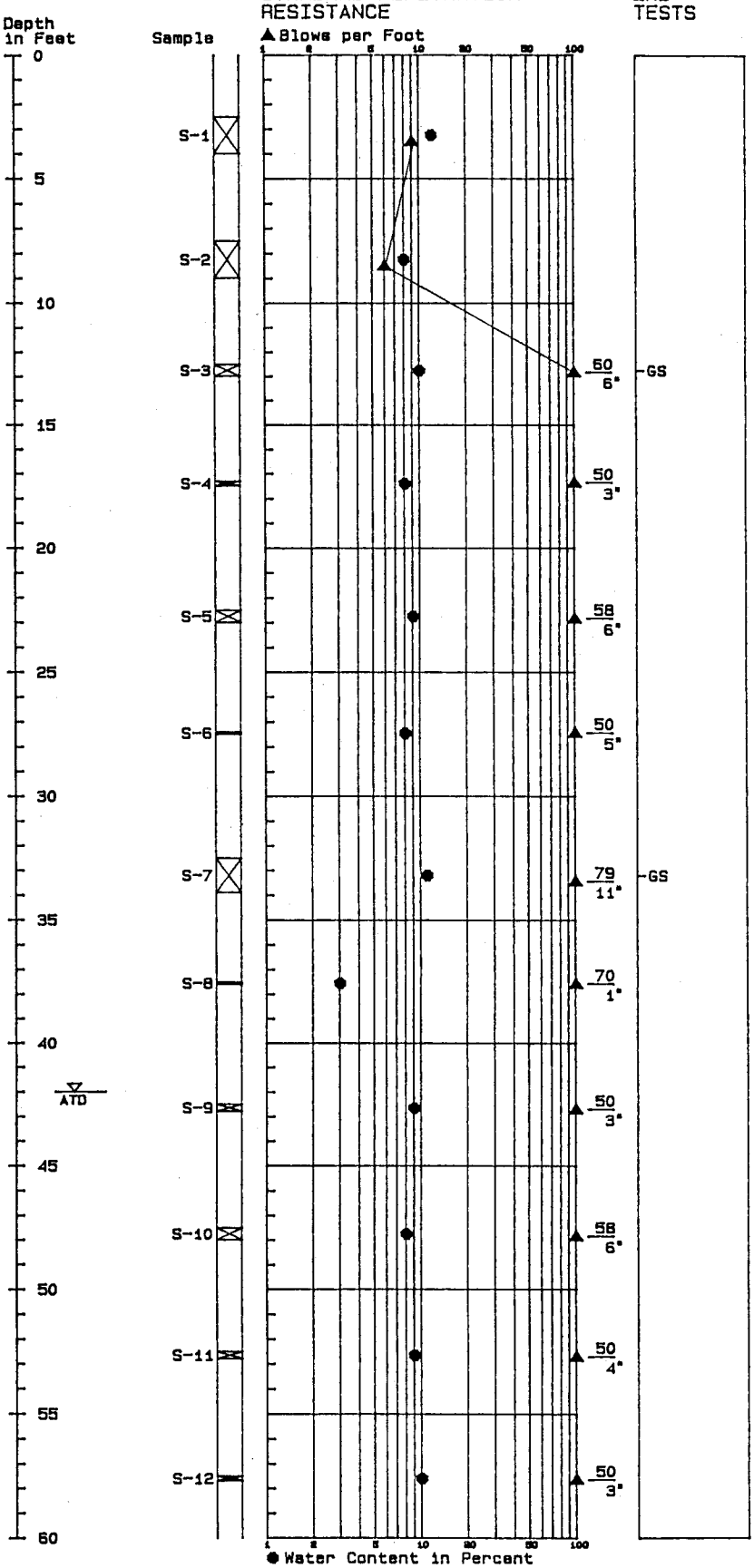
Ground Surface Elevation in Feet 343

Loose, moist, brown, slightly silty, slightly gravelly to gravelly SAND. (FILL)

Very dense, damp, gray, gravelly, very silty SAND. (TILL)

- Samples indicate variable silt and gravel contents.
- Drill action indicates 1-foot-zone of water.
- Grades dark gray.
- Drill action indicates cobbly zones.

Bottom of Boring at 60.0 Feet.
Completed 11/24/87.



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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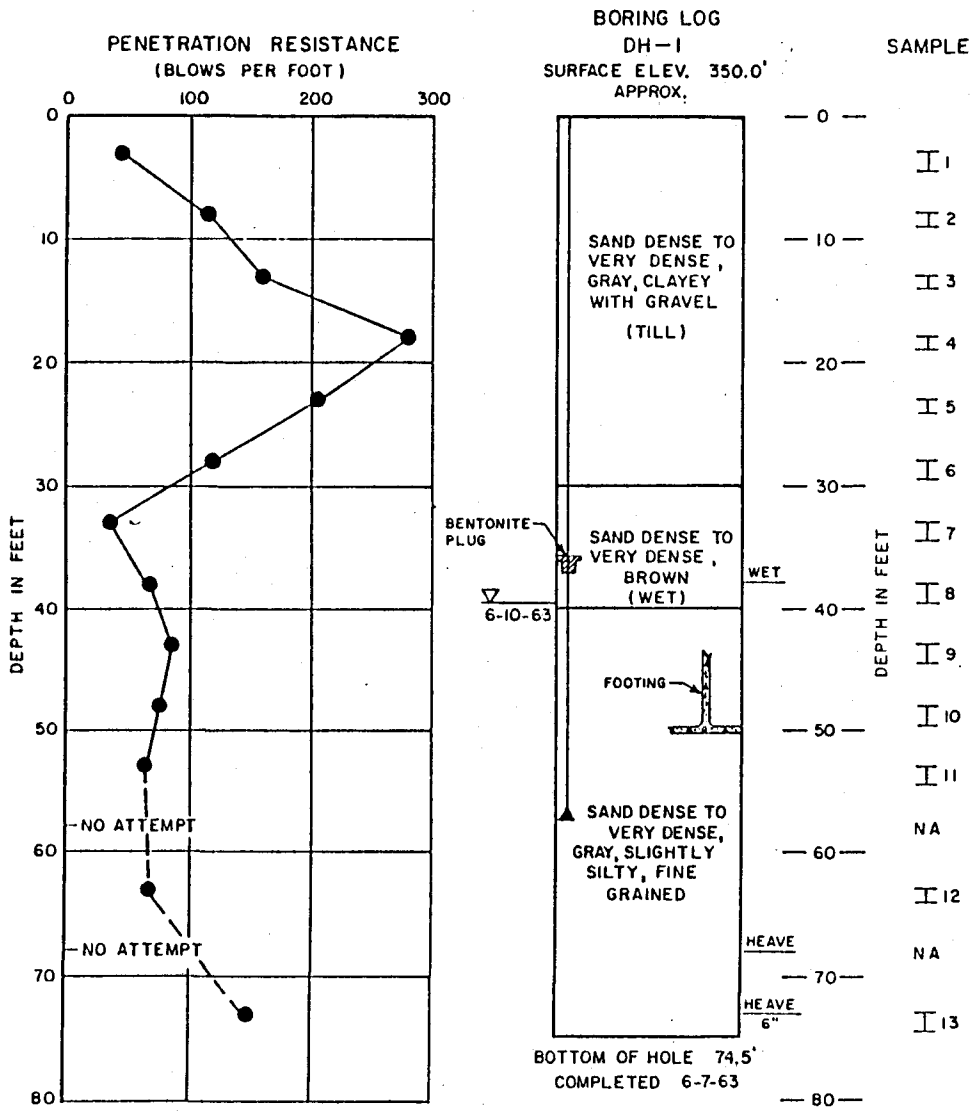
HART-CROWSER & associates, inc.
Figure A-4



PROVIDENCE HOSPITAL ADDITION

DRILL HOLE - 1

W-63-209 JUNE, 1963

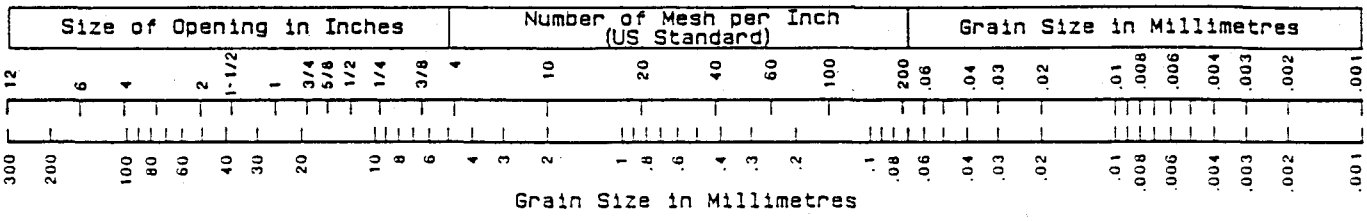
Shannon and Wilson
Soil mechanics and foundation engineers
Seattle

FIGURE 2

Figure A-5

Unified Soil Classification (USC) System

Soil Grain Size



COBBLES	GRAVEL	SAND	SILT and CLAY
Coarse-Grained Soils			Fine-Grained Soils

Coarse-Grained Soils

G W	G P	G M	G C	S W	S P	S M	S C
Clean GRAVEL <5% fines	*	GRAVEL with >12% fines		Clean SAND <5% fines	*	SAND with >12% fines	
GRAVEL >50% coarse fraction larger than No. 4				SAND >50% coarse fraction smaller than No. 4			
Coarse-Grained Soils >50% larger than No. 200 sieve							

G W and S W $\left(\frac{D_{60}}{D_{10}}\right)>4$ for G W, >6 for S W & $1 \leq \left(\frac{(D_{30})^2}{D_{10} \times D_{60}}\right) \leq 3$ G P and S P Clean GRAVEL or SAND not meeting requirements for G W and S W

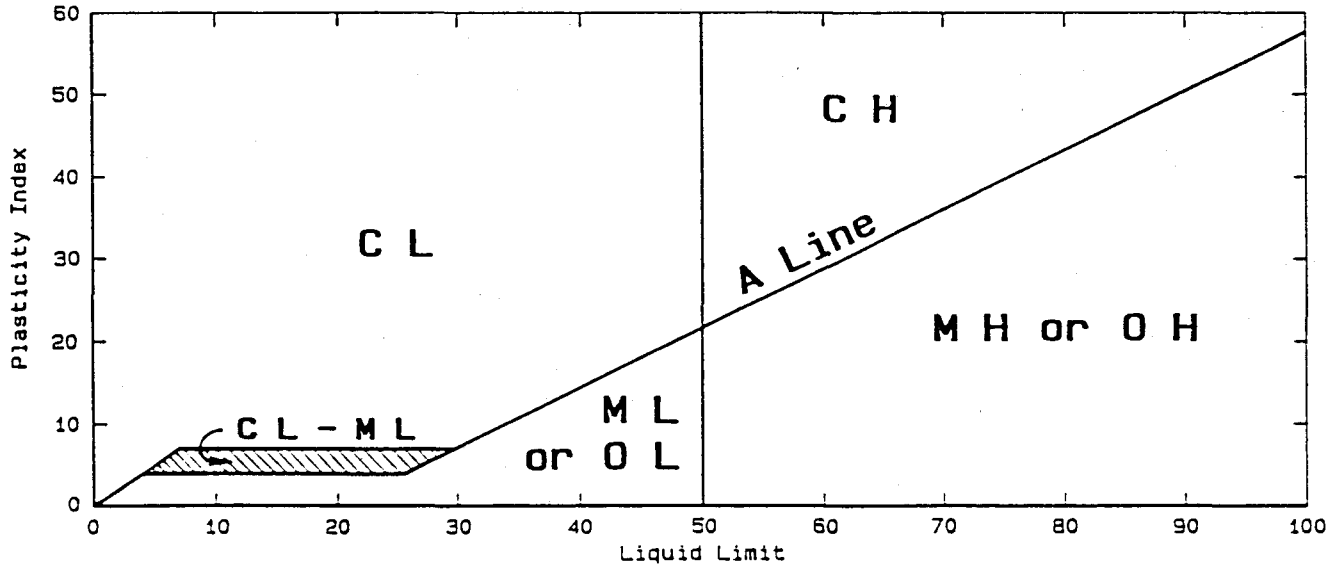
G M and S M Atterberg limits below A Line with PI <4 G C and S C Atterberg limits above A Line with PI >7

* Coarse-grained soils with percentage of fines between 5 and 12 are considered borderline cases requiring use of dual symbols.

D_{10}, D_{30}, and D_{60} are the particle diameter of which 10, 30, and 60 percent, respectively, of the soil weight are finer.

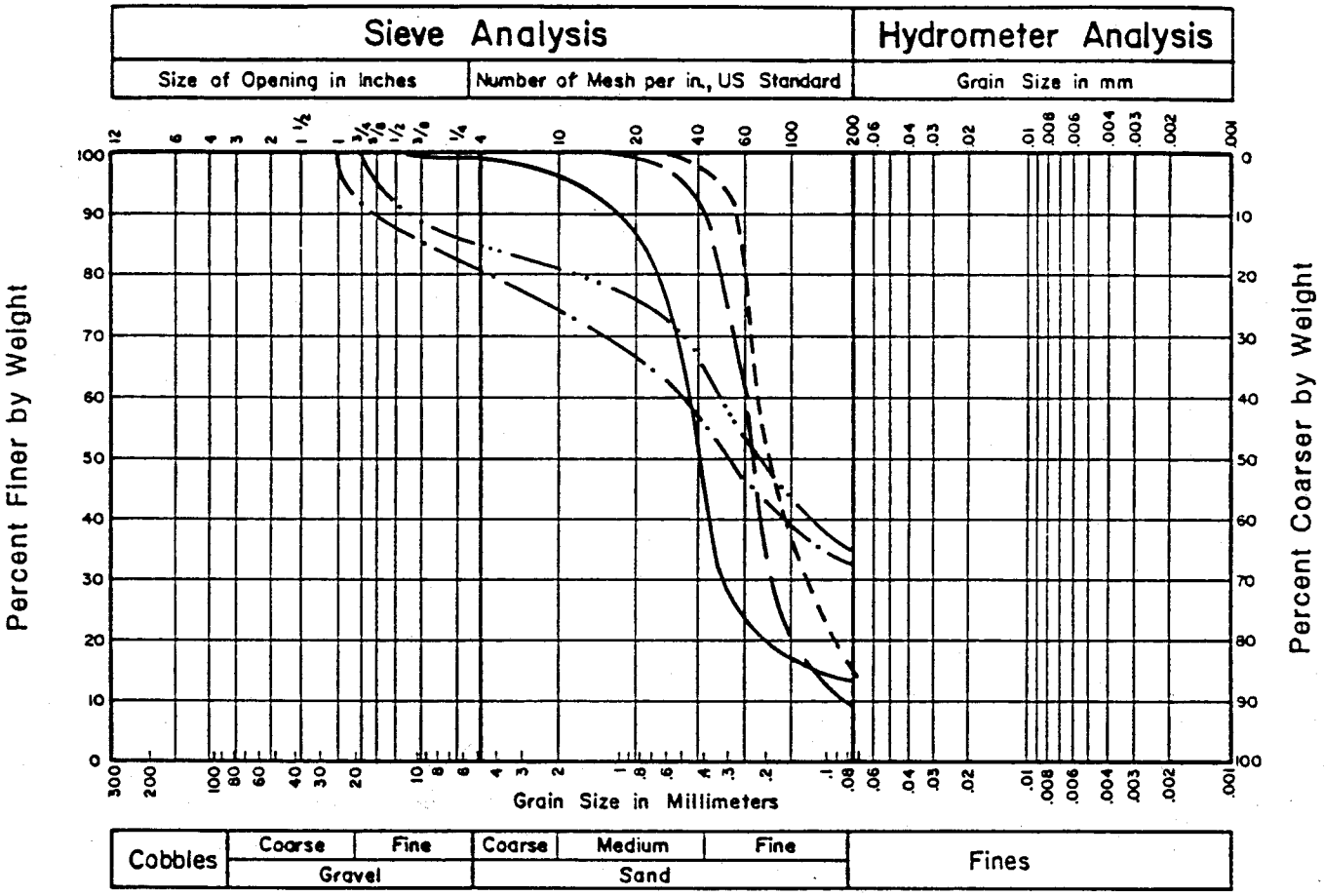
Fine-Grained Soils

M L	C L	O L	M H	C H	O H	Pt
SILT	CLAY	Organic	SILT	CLAY	Organic	Highly Organic Soils
Soils with Liquid Limit <50%			Soils with Liquid Limit >50%			
Fine-Grained Soils >50% smaller than No. 200 sieve						



J-2071 January 1988
HART-CROWSER & associates, inc.
Figure B-1

Grain Size Classification



LINE SYMBOL	BORING NUMBER	SAMPLE NUMBER	DEPTH IN FEET	CLASSIFICATION	UNIFIED SOIL CLASS.	WATER CONTENT PERCENT
———	B-1	S-1	12.5 - 14.0	Silty, medium to fine SAND.	SM	8
— —	B-2	S-9	42.5 - 44.0	Slightly silty, medium to fine SAND.	SP-SM	6
— — —	B-2	S-12	57.5 - 58.0	Silty fine SAND.	SM	22
—·—	B-3	S-3	12.5 - 14.0	Gravelly, very silty SAND.	SM	8
—···—	B-3	S-7	32.5 - 34.0	Gravelly, very silty, medium to fine SAND.	SM	11

J-2071 December 1987
HART-CROWSER & associates, inc.
Figure B-2

- ☐ City box number 16th - 19th Ave
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☑ Report Date
  - ☑ Project name
  - ☑ Company's job number
  - ☐ 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
  - ☑ Site address (may be on 1st or 2nd page of text)
- ☐ Executive Summary and associated figures
- ☑ Table of Contents
- ☐ Project Location Plan/Map or Vicinity Map
- ☑ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☑ Cross Sections/Subsurface Profiles
- ☐ Fill or Peat Thickness Maps and Contour Maps
- ☑ 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_____

  _____
- ☐ Date Copied 7-14-99 By AS

334

2/9/99

569982

W-3007-01

5/5

(334)

511 16th Ave

511 16TH AV

210176 569982

FOUNDATION ENGINEERING
PROPOSED PARKING BUILDING
PROVIDENCE MEDICAL CENTER
16TH AVENUE & EAST JEFFERSON STREET
SEATTLE, WASHINGTON

210176

FOR

LEO A. DALY & ASSOCIATES

BROADCAST HOUSE

THIRD AVENUE & BROAD STREET

SEATTLE, WASHINGTON 98121

APRIL 15, 1976

BY

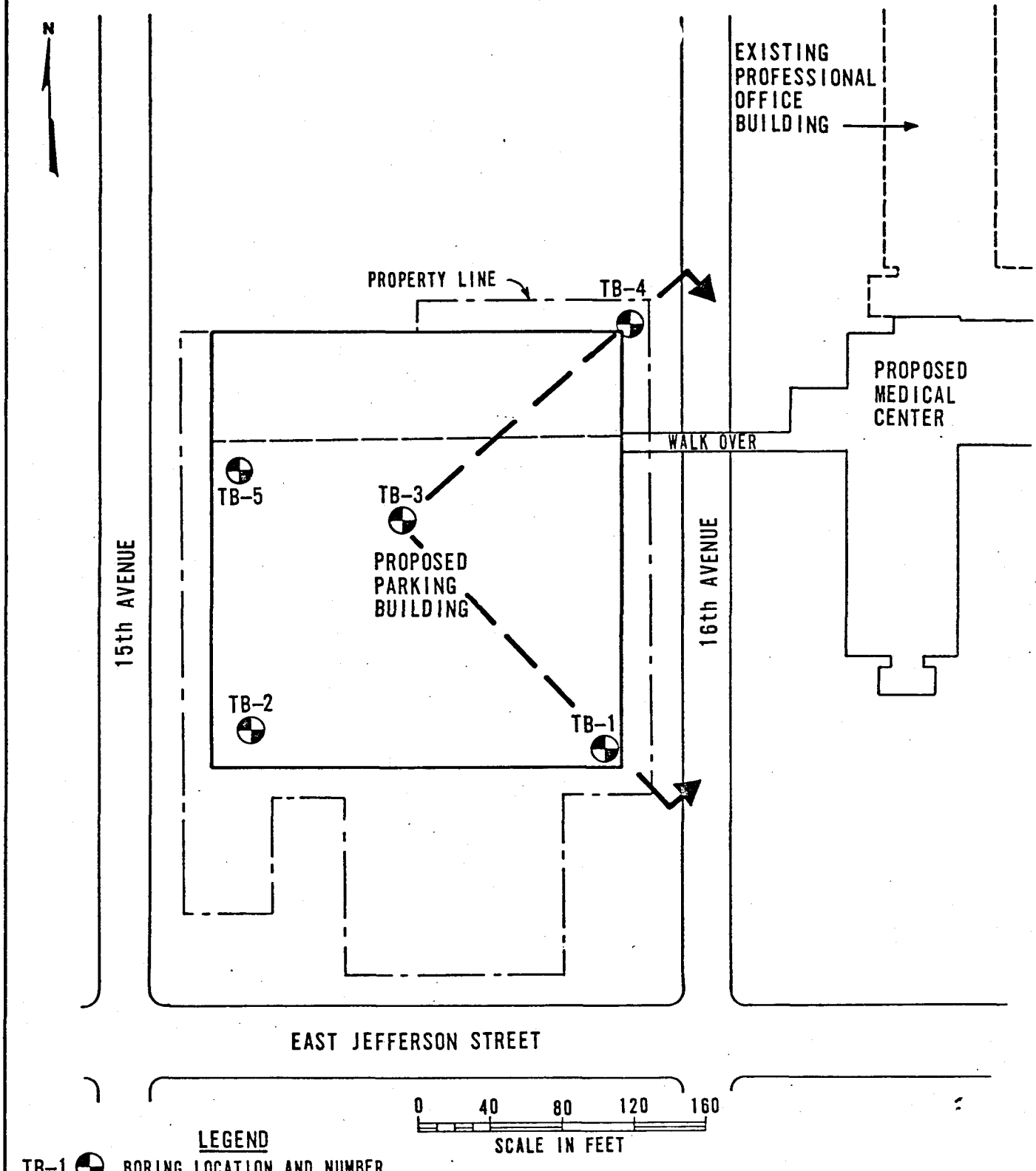
SHANNON & WILSON, INC.

GEOTECHNICAL CONSULTANTS

1105 NORTH 38TH STREET

SEATTLE, WASHINGTON 98103

TABLE OF CONTENTS


N
EXISTING PROFESSIONAL OFFICE BUILDING
PROPERTY LINE
TB-4
PROPOSED MEDICAL CENTER
WALK OVER
TB-5
TB-3
PROPOSED PARKING BUILDING
15th AVENUE
16th AVENUE
TB-2
TB-1
EAST JEFFERSON STREET
0 40 80 120 160
SCALE IN FEET
LEGEND
TB-1 BORING LOCATION AND NUMBER
LOCATION OF SUBSURFACE PROFILE, SEE FIG. 2
NOTE
THIS DRAWING BASED UPON PRELIMINARY "SITE PLAN" PROVIDED BY LEO A. DALY AND ASSOCIATES.
PROPOSED PARKING BUILDING
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SEATTLE, WASHINGTON
EXPLORATION PLAN
APRIL 1976
W-3007-01
SHANNON & WILSON, INC.
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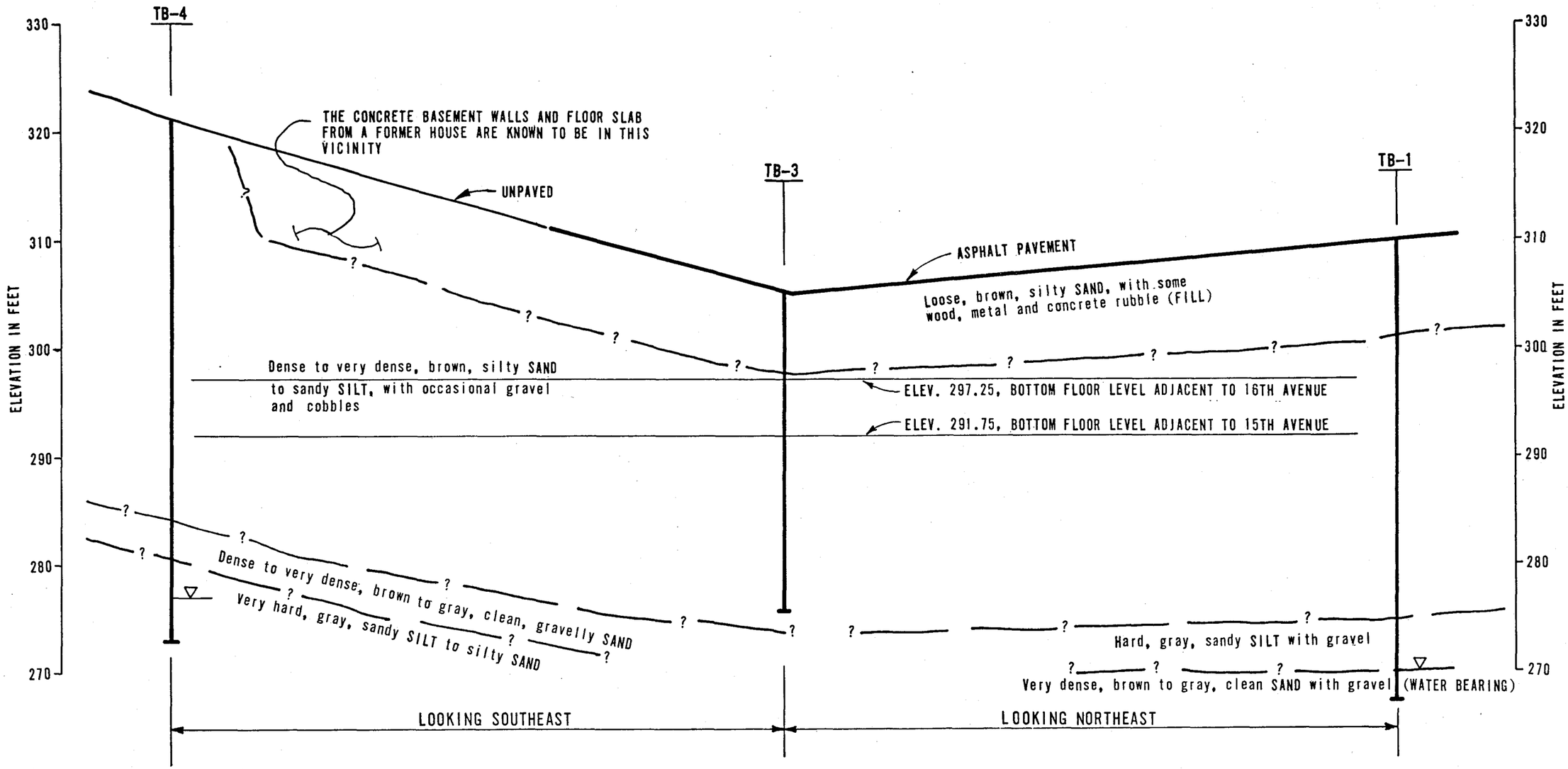
FIG. 1



NOTES

1. See Figure 1 for location of section.
2. The profile is generalized from materials encountered in the borings and variations between the profile and actual conditions may exist

LEGEND

Water level during drilling, March 16 & 17, 1976

0 10 20 30
HORIZONTAL SCALE IN FEET
(30 SCALE)

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SEATTLE, WASHINGTON

SUBSURFACE PROFILE

APRIL 1976 W-3007-01
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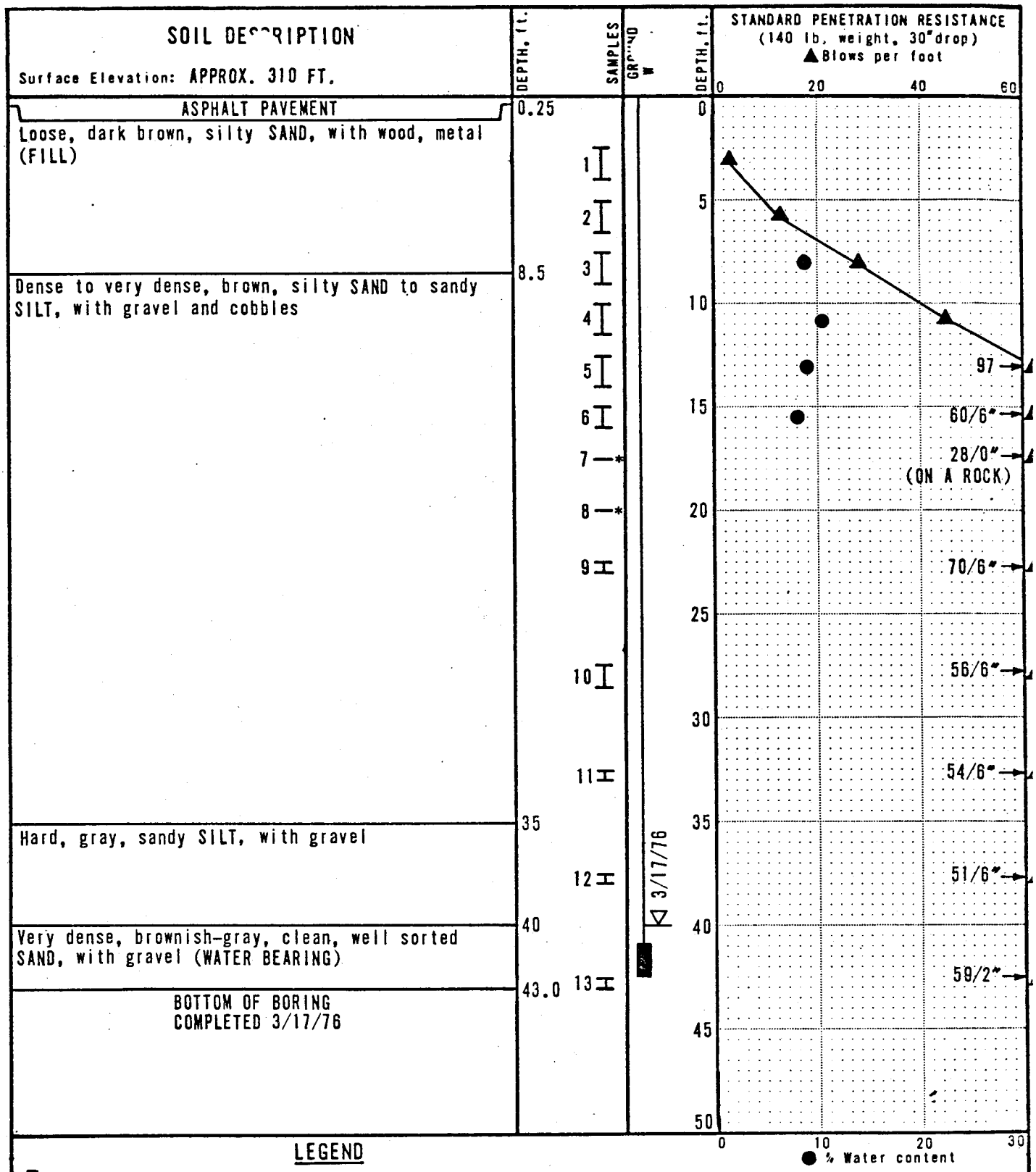
FIG. 2



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

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

PROPOSED PARKING BUILDING
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SEATTLE, WASHINGTON

LOG OF BORING TB-1

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FIG. 3

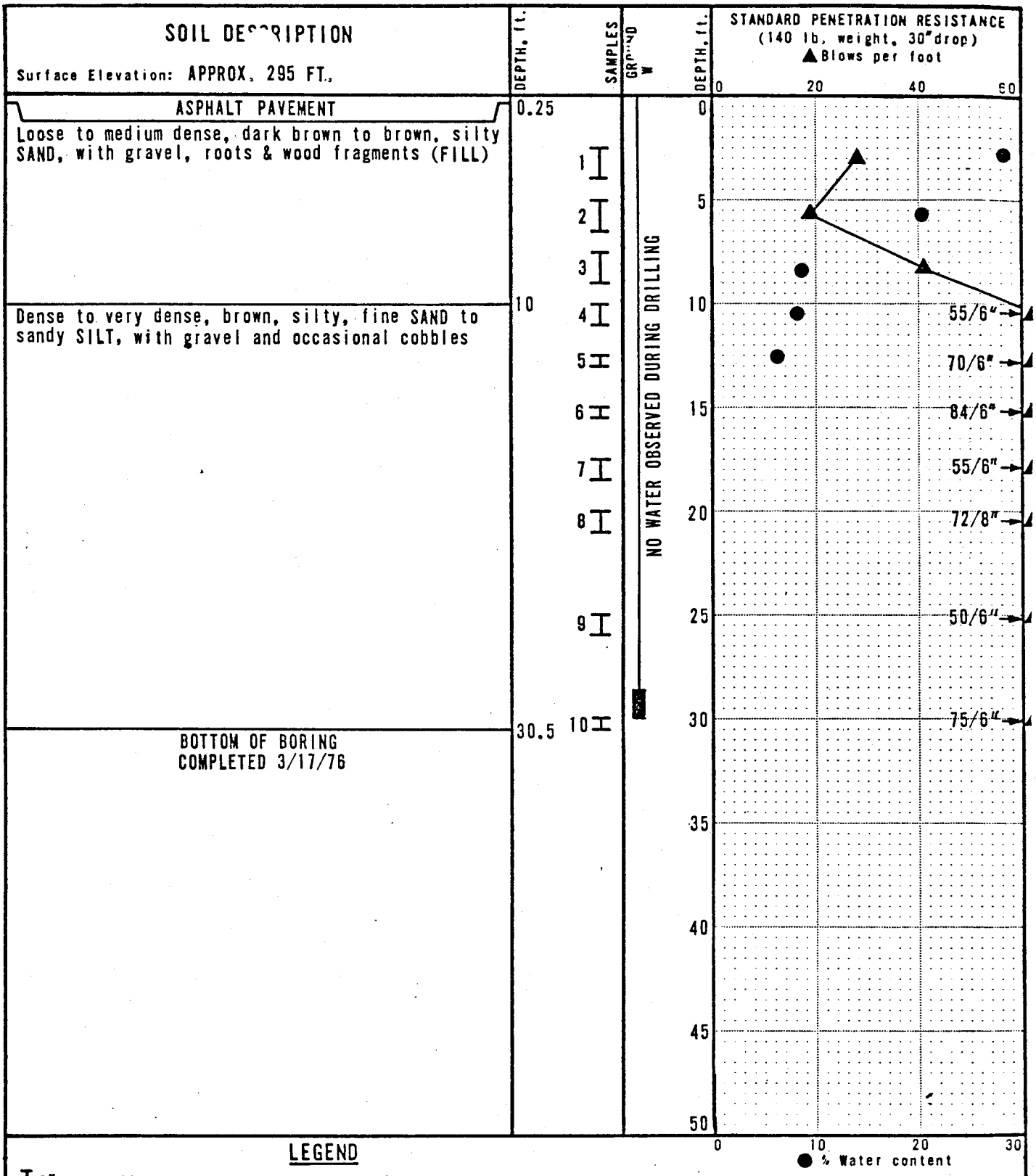
SOIL DESCRIPTION
Surface Elevation: APPROX. 295 FT.
DEPTH, ft.
SAMPLES
GROUND WATER
DEPTH, ft.
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
60
ASPHALT PAVEMENT
0.25
Loose to medium dense, dark brown to brown, silty SAND, with gravel, roots & wood fragments (FILL)
1
2
3
10
Dense to very dense, brown, silty, fine SAND to sandy SILT, with gravel and occasional cobbles
4
5
6
7
8
9
30.5
10
BOTTOM OF BORING
COMPLETED 3/17/76
NO WATER OBSERVED DURING DRILLING
55/6"
70/6"
84/6"
55/6"
72/8"
50/6"
75/6"
0
5
10
15
20
25
30
35
40
45
50
0
10
20
30
● % Water content
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
NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
PROPOSED PARKING BUILDING
PROVIDENCE MEDICAL CENTER
SEATTLE, WASHINGTON
LOG OF BORING TB-2
APRIL 1976
W-3007-01
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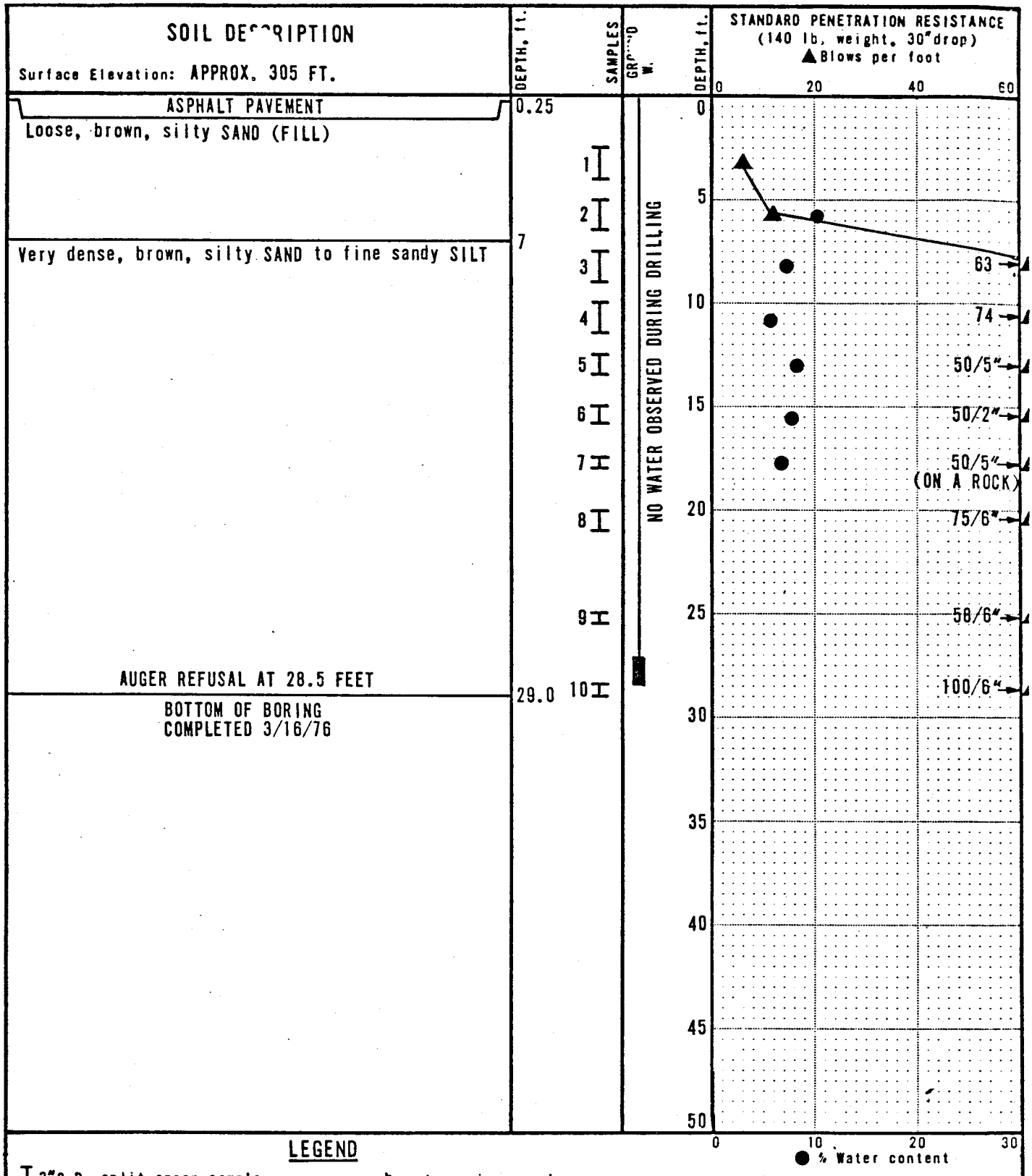
FIG. 4



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

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

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LOG OF BORING TB-3

APRIL 1976 W-3007-01

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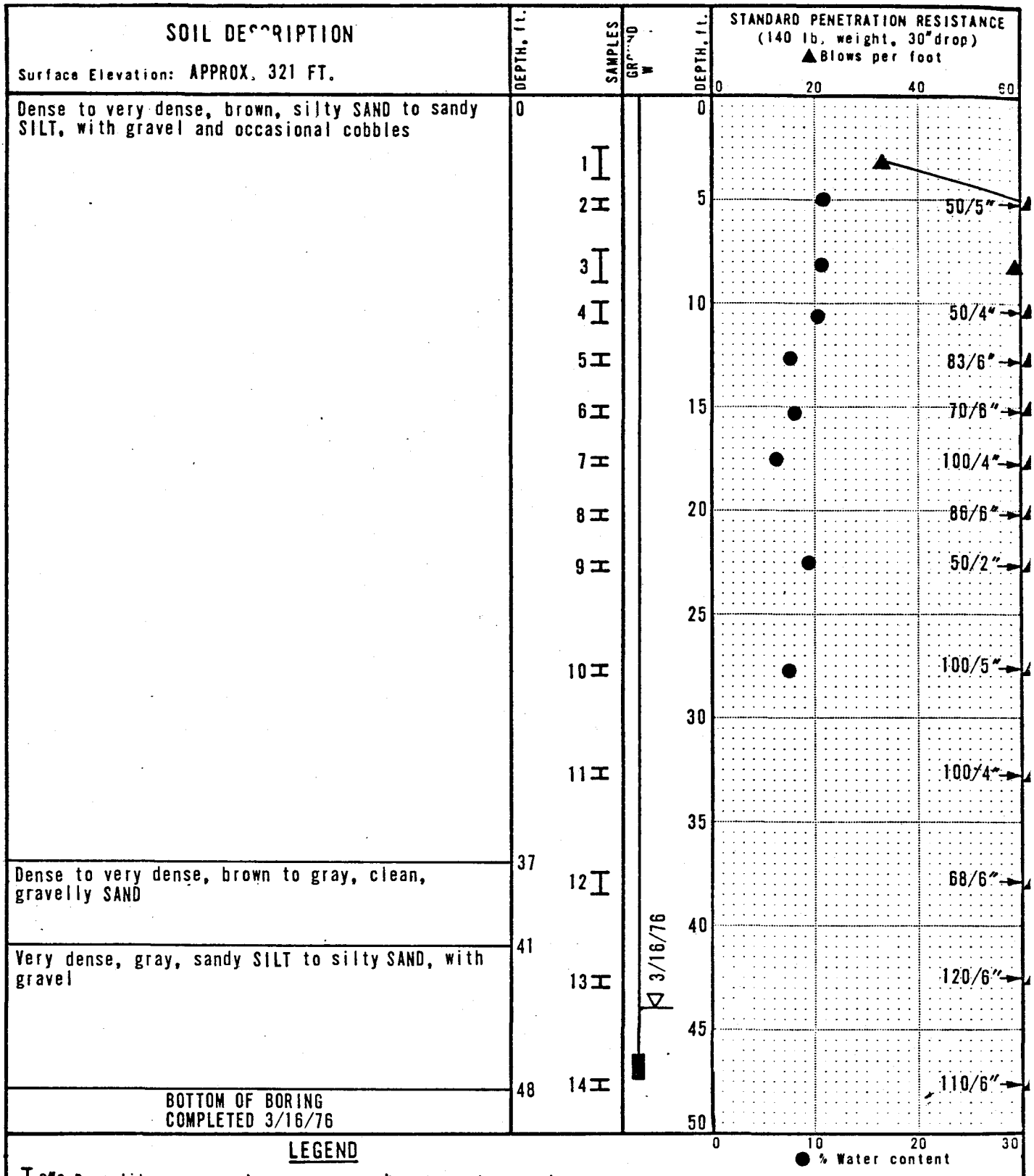
FIG. 5



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

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

PROPOSED PARKING BUILDING
PROVIDENCE MEDICAL CENTER
SEATTLE, WASHINGTON

LOG OF BORING TB-4

APRIL 1976 W-3007-01

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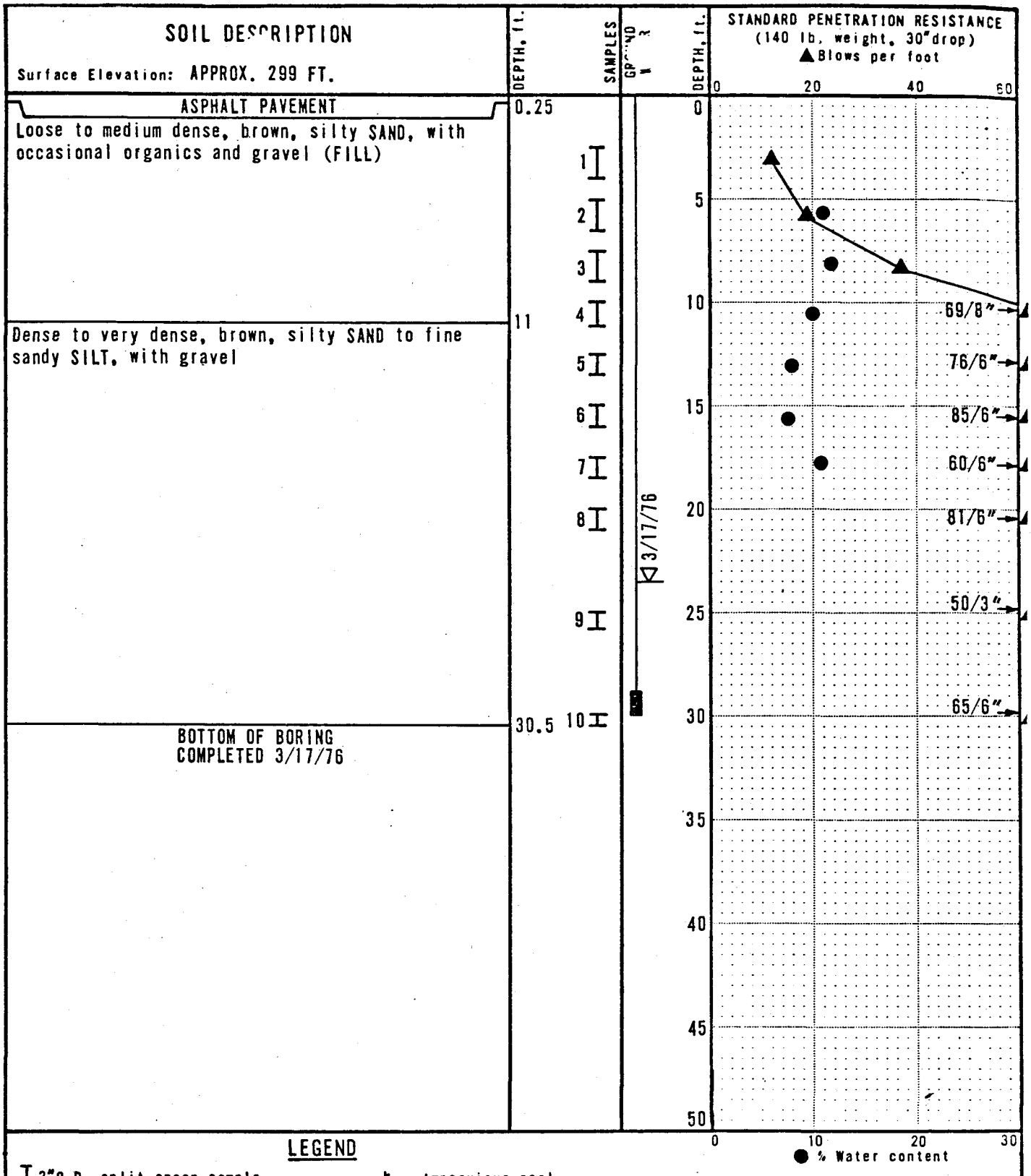
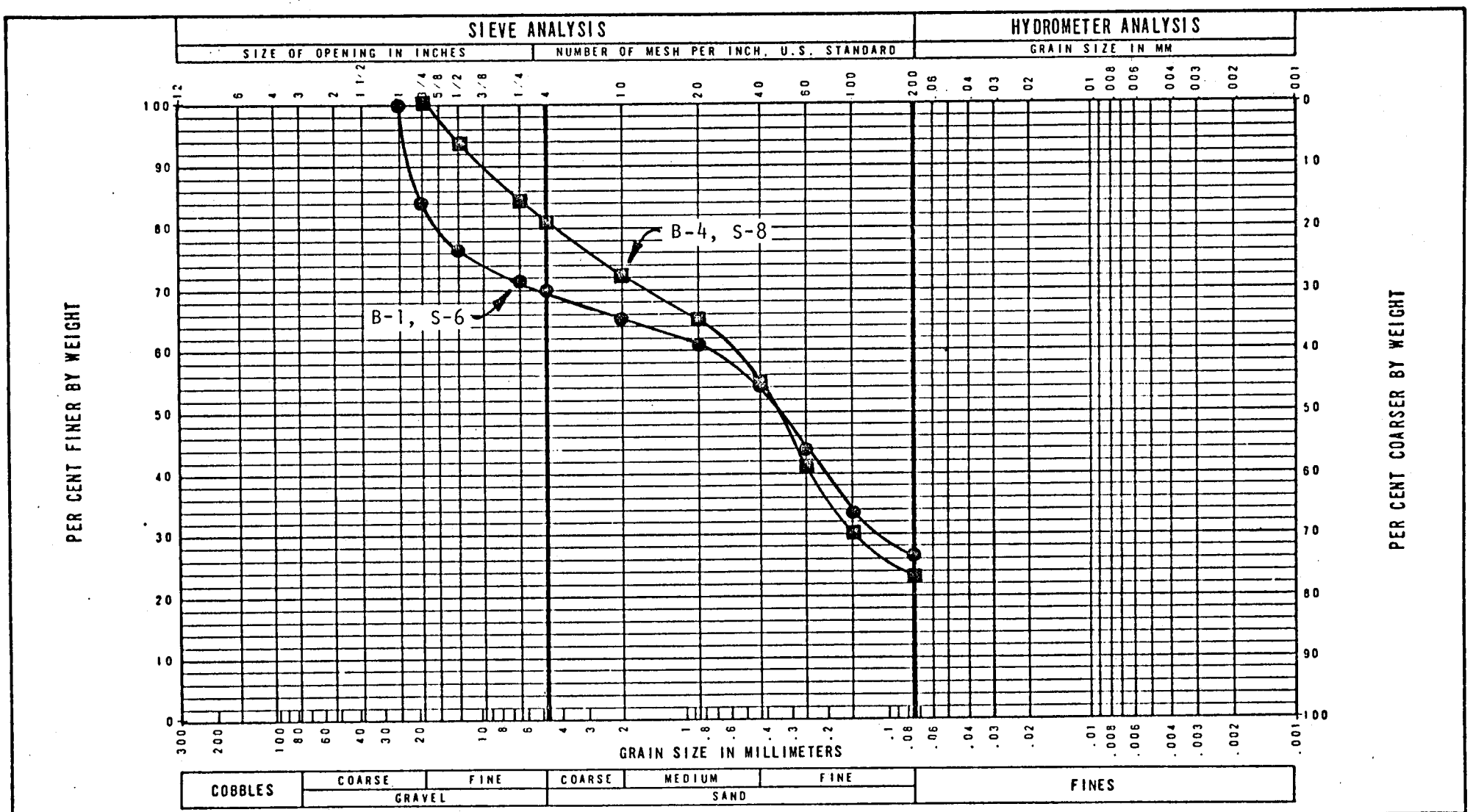
FIG. 6


SOIL DESCRIPTION
Surface Elevation: APPROX. 299 FT.
DEPTH, ft.
SAMPLES
GROUND WATER
DEPTH, ft.
STANDARD PENETRATION RESISTANCE
(140 lb. weight, 30" drop)
▲ Blows per foot
0
20
40
60
ASPHALT PAVEMENT
0.25
Loose to medium dense, brown, silty SAND, with occasional organics and gravel (FILL)
1
2
3
11
4
Dense to very dense, brown, silty SAND to fine sandy SILT, with gravel
5
6
7
8
3/17/76
9
30.5
10
BOTTOM OF BORING
COMPLETED 3/17/76
0
5
10
15
20
25
30
35
40
45
50
69/8"
76/6"
85/6"
60/6"
81/6"
50/3"
65/6"
0
10
20
30
● % Water content
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
NOTE: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
PROPOSED PARKING BUILDING
PROVIDENCE MEDICAL CENTER
SEATTLE, WASHINGTON
LOG OF BORING TB-5
APRIL 1976
W-3007-01
SHANNON & WILSON, INC.
GEOTECHNICAL CONSULTANTS



SAMPLE NO.	DEPTH-FT.	U.S.C.	CLASSIFICATION	NAT. W.C. %	LL	PL	PI
B-1, S-4	10.0-11.5	SM	Gray, silty, gravelly SAND	8.1			
B-4, S-8	20.0-20.5	SM	Gray, silty, gravelly SAND	6.5			

PROPOSED PARKING BUILDING
PROVIDENCE MEDICAL CENTER

GRAIN SIZE CLASSIFICATION

Borings B-1 and B-4

April 1976 W-3007-01

SHANNON & WILSON, INC.
GEOTECHNICAL CONSULTANTS

FIG. 10

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-1

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/18/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-1	2.5-4.0	3							Loose, gray-brown, silty, fine to medium SAND, trace of coarse sand, fine gravel and small pockets of brown, clayey silt. Scattered organics. Moist.
S-2	5.0-6.5	13							Same as S-1, except medium dense and red-brown.
S-3	7.5-9.0	28	8.8						Medium dense, gray-brown, silty, fine to medium SAND, trace of fine gravel. Moist.
S-4	10.0-11.5	45	10.4						Very dense, gray-brown, silty, fine to medium SAND, trace of coarse sand, fine gravel and organics. Moist to wet.
S-5	12.5-14.0	97	9.0						Very dense, gray-brown, silty, fine gravelly, fine to coarse SAND. Moist. (Till like)
S-6	15.0-16.0	22,60, 60/6"	8.1					M.A.	Same as S-5.
S-7	17.5-	28/0"							No Recovery.
S-8	20.0-	--							Same as S-5.
S-9	22.5-23.0	70/6"							Same as S-5.

BORING NO. B-1 SHEET NO. 1

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-1

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/18/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	ATTERBERG LIMITS, % PL	ATTERBERG LIMITS, % PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-10	27.5-28.5	56/6"							Very dense, gray-brown to gray, silty, fine SAND, with pockets of clean fine to medium sand and trace of fine gravel. Wet.
S-11	32.5-33.0	54/6"							Very dense, gray, silty, fine gravelly, fine to coarse SAND. Moist. (Till)
S-12	37.5-38.0	51/6"							Same as S-11.
S-13	42.5-43.2	50/2"							Very dense, gray-brown to gray, silty, fine to medium SAND with pockets of clean, fine to coarse sand and clayey silt, trace of fine gravel. Wet.

BORING NO. B-1 SHEET NO. 2

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-2

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/18/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-1	2.5-4.0	28	28.2						Medium dense, gray and dark brown, silty, fine to medium SAND, trace of fine gravel, and with numerous wood fragments. Moist.
S-2	5.0-6.5	19	20.2						Same as S-1, except brown and with small pockets of clayey silt.
S-3	7.5-9.0	41	8.6						Dense, gray-brown, silty, fine to medium SAND, trace of coarse sand, fine gravel and organics, with lenses of yellow-brown, fine to coarse sand. Moist. (Till like)
S-4	10.0-11.0	55/6"	8.1						Very dense, gray, silty, fine to coarse gravelly, fine to coarse SAND. Moist. (Till)
S-5	12.5-13.0	70/6"	6.3						Same as S-4.
S-6	15.0-15.5	84/6"							Same as S-4.
S-7	17.5-18.5	55/6"							Same as S-4, except fine gravelly.
S-8	20.0-21.2	72/8"							Very dense, alternating layers of fine sandy SILT, silty fine SAND, slightly clayey silt with lenses and partings of fine to medium sand. Trace of fine gravel. Moist.

BORING NO. B-2 SHEET NO. 1

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-2

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/18/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/ 12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-9	25.0-26.0	50/6"							Same as S-4, except wet and with small pockets of clayey silt.
S-10	30.0-30.5	75/6"							Same as S-7.

BORING NO. B-2 SHEET NO. 2

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-3

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/18/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-1	2.5-4.0	13							Medium dense, brown, silty, fine to medium SAND, trace of coarse sand, fine gravel and organics. Moist.
S-2	5.0-6.5	12	10.3						Same as S-1.
S-3	7.5-9.0	63	7.2						Very dense, gray-brown, silty, fine gravelly, fine to coarse SAND. Moist. (Till)
S-4	10.0-11.5	74	5.8						Same as S-3.
S-5	12.5-13.4	50/5"	8.2						Same as S-3.
S-6	15.0-15.8	50/2"	7.9						Same as S-3.
S-7	17.5-17.9	50/5"	6.8						Same as S-3.
S-8	20.0-21.0	75/6"							Same as S-3.
S-9	25.0-25.5	58/6"							Same as S-3.
S-10	28.5-29.0	100/6"							Same as S-3.

BORING NO. B-3 SHEET NO. 1

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-4

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/19/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-1	2.5-4.0	33							Dense, gray-brown, silty, fine to medium SAND, trace of coarse sand, fine gravel and pockets of organics. Moist.
S-2	5.0-5.4	50/5"	10.8						Very dense, gray, silty, fine gravelly, fine to medium SAND, trace of coarse gravel. Moist. (Till)
S-3	7.5-9.0	59	10.7						Same as S-2.
S-4	10.0-10.8	50/4"	10.4						Same as S-2.
S-5	12.5-13.0	83/6"	7.7						Same as S-2, except with pocket of gray clayey silt and moist.
S-6	15.0-15.5	70/6"	8.0						Same as S-2.
S-7	17.5-17.8	100/4"	6.2						Same as S-2.
S-8	20.0-20.5	86/6"						M.A.	Same as S-2.
S-9	22.5-23.2	50/2"	9.4						Same as S-2.
S-10	27.5-27.9	100/5"	7.5						Same as S-2.

BORING NO. B-4 SHEET NO. 1

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-4

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/19/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	ATTERBERG LIMITS, % PL	ATTERBERG LIMITS, % PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-11	32.5-32.8	100/4"							Same as S-2.
S-12	37.5-38.5	68/6"							Very dense, gray, slightly silty, fine gravelly, fine to coarse SAND. Wet.
S-13	42.5-43.0	120/6"							Same as S-2.
S-14	47.5-48.0	110/6"							Very dense, gray, silty, fine to coarse SAND, trace of fine gravel and with lenses of clean fine to medium sand. Wet.

BORING NO. B-4 SHEET NO. 2

CLASSIFIED BY FAM CHECKED BY HE

TABLE I

SUMMARY OF TEST RESULTS

BORING NO. B-5

SHANNON & WILSON, INC.

JOB NO. W-3007-01 DATE 3/19/76

SAMPLE NO.	DEPTH FT.	STANDARD PENETRATION RESISTANCE BLOWS/ 12"	NATURAL WATER CONTENT %	ATTERBERG LIMITS, % LL	PL	PI	SHEAR STRENGTH TSF	OTHER TESTS	SOIL CLASSIFICATIONS
S-1	2.5-4.0	12							Medium dense, dark brown, silty, fine to medium SAND, trace of coarse sand and fine gravel. Numerous organics. Moist. (Fill)
S-2	5.0-6.5	19	11.1						Medium dense, gray, silty, fine gravelly, fine to medium SAND. Moist. (Till)
S-3	7.5-9.0	37	11.8						Same as S-2, except dense.
S-4	10.0-11.2	69/8"	10.0						Same as S-2, except very dense.
S-5	12.5-13.5	70/6"	8.0						Same as S-2, except very dense.
S-6	15.0-16.0	85/6"	7.7						Same as S-2, except very dense.
S-7	17.5-18.5	60/6"	10.9						Same as S-2, except very dense.
S-8	20.0-21.0	81/6"							Same as S-2, except very dense.
S-9	25.0-25.8	50/3"							Same as S-2, except very dense.
S-10	30.0-30.5	65/6"							Same as S-2, except very dense.

BORING NO. B-5 SHEET NO. 1

CLASSIFIED BY FAM CHECKED BY HE

- ☐ City box number 102
- ☐ Title/cover page w/the following info:
  - ☑ Company (author) name
  - ☑ Report Date
  - ☑ Project name
  - ☑ Company's job number
  - ☐ 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
  - ☑ Site address (may be on 1st or 2nd page of text)
- ☐ Executive Summary and associated figures
- ☑ Table of Contents
- ☐ Project Location Plan/Map or Vicinity Map
- ☑ Site Plans, Boring Location Plans, or Exploration Plans
- ☐ Survey
- ☐ Geologic Maps
- ☐ Cross Sections/Subsurface Profiles
- ☐ Fill or Peat Thickness Maps and Contour Maps
- ☑ 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_____

_____

- ☐ Date Copied 10-5-99. By CH

2/9/99

528 18th Ave

GEOTECHNICAL EXPLORATION AND ENGINEERING REPORT

Microfilm

1827

THE BOB HOPE INTERNATIONAL HEART RESEARCH INSTITUTE

Seattle, Washington

Prepared for

HDI Architects

515

6-15-83

June 1983

W-4011

RITTENHOUSE-ZEMAN & ASSOCIATES

Geotechnical Consultants

13837 N.E. Eighth Street
Bellevue, Washington 98005
(206) 746-8020

W-4011

15 June 1983

Microfilm

HDI Architects
P.O. Box 4087
Bellevue, Washington 98009

Attention: Mr. J. Pat Lally
President

Subject: Subsurface Exploration and Geotechnical Engineering Study
The Bob Hope International Heart Research Institute
Seattle, Washington

Gentlemen:

We are pleased to present herein a copy of the above referenced report. This report presents the results of our subsurface exploration program and our geotechnical engineering studies relative to the foundation and construction considerations for the proposed project. Verbal authorization to proceed with this study was granted by Mr. J. Pat Lally on 2 June 1983. Our work has been completed in general accordance with our revised proposal letter dated 31 May 1983.

The proposed site for the project consists of an asphalt paved parking lot and an elevated lawn area immediately south of the existing Research Institute. With the exception of the aforementioned lawn area, our explorations disclosed very dense glacially consolidated soils at or near the ground surface. These subsurface conditions allow for the utilization of shallow foundation support for the building. The proposed location and elevation of the structure in relation to the existing building are such that underpinning of the existing building will be necessary.

Recommendations are presented herein for the excavation, shoring and underpinning considerations, structural fill, slab-on-grade construction, shallow spread footings, lateral earth pressures, and drainage considerations.

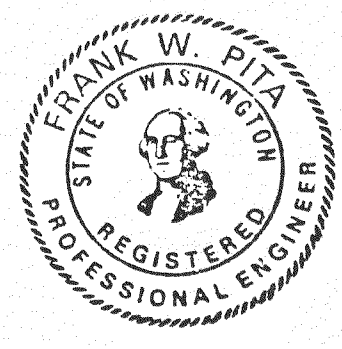
We appreciate the opportunity to be of service to you on this project and would be pleased to discuss the contents of this report or other aspects of the project with you at your convenience.

Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

J. Robert Gordon,
Project Engineer

Frank W. Pita, P.E., P.G.
Vice-President



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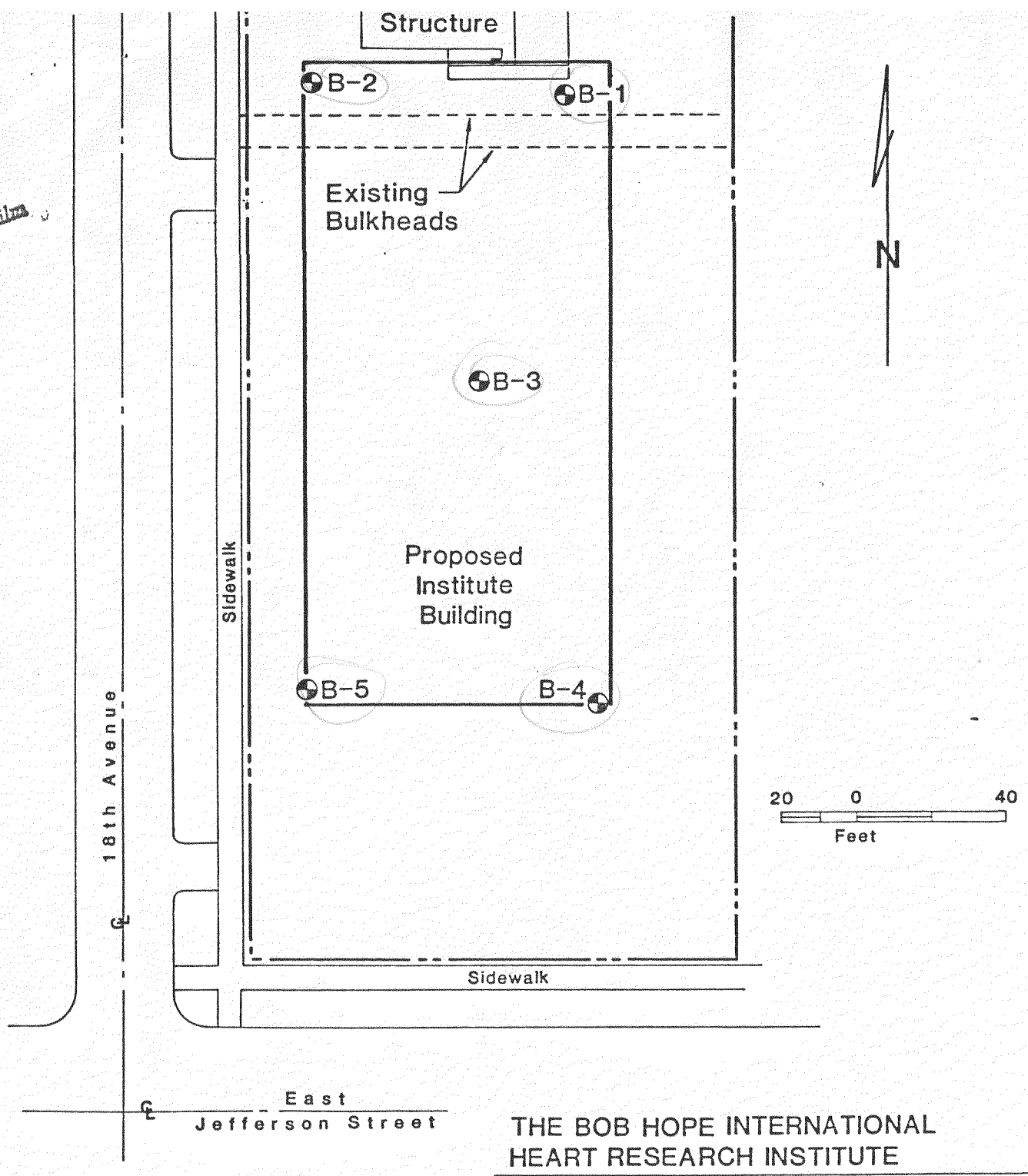


THE BOB HOPE INTERNATIONAL
HEART RESEARCH INSTITUTE

FIGURE 1
SITE PLAN

528 18th Ave
NO ##

Legend

B-5 Boring Number and Approximate Location

Reference:

Plan taken from "Site Plan, The Bob Hope International Heart Research Institute," by HDI Architects, May 11, 1983

RITTENHOUSE - ZEMAN & ASSOC.
FOUNDATION AND SOILS ENGINEERING, GEOLOGY

13837 N.E. 8th Street
Bellevue, Washington 98005
746-8020

W.O.	W-4011	DATE	June 1983
BY	JRG	SCALE	See Bar

Microfilm

Surface Elevation: 334 feet

(140 lb. hammer, 30" drop)

DEPTH		SAMPL	GROUT	10 20 30 40 50
	SOD			
	Loose, moist, brown, fine to medium SAND with some silt, gravel and trace roots, organics (Fill)	I		▲ ● 51/6"
5	Very dense, moist, brown/gray, gravelly, fine to coarse SAND with trace silt (Glacial Till)	I		● 53/6"
		I		● 70/6"
10	- with some silt	I		● (Rock) 50/2"
		I		● 50/6"
15		I		● 50/3"
				-
20	- 3" silty SAND layer - 2" sandy SILT layer	I		● 50/3"
25		I		● 54/4"
		I		● 60/6"
30				
35	- becomes wet, gray	I		● 75/6"
40				

LEGEND

- I 2.0" O.D. split spoon sampler
- II 3.0" O.D. undisturbed sampler
- P Sampler pushed
- • Sample not recovered
- Piezometer tip
- ▽ Water level
- Atterberg limits: ⊢●⊣ Liquid limit; Natural water content; Plastic Limit

● % Water Content

Bob Hope International Heart Research Inst.

W-4011

LOG OF BORING NO. B-1

RITTENHOUSE-ZEMAN & ASSOC.
SOILS ENGINEERING AND GEOLOGY

DEPTH,	Surface Elevation:	SAMPLI	GROUN	Blows per foot (140 lb. hammer, 30" drop) 10 20 30 40 5
45	Very dense, wet, brown/gray, silty fine to coarse SAND with some gravel	I		83/10"
	-becomes gray with some silt	I		75/6"
50		I		70/6"
55	Boring terminated at 53.5 feet Completed 6 June 1983			
60				
65				
70				
75				
80				

Microfilm

LEGEND

- I 2.0" O.D. split spoon sampler
- II 3.0" O.D. undisturbed sampler
- P Sampler pushed
- Sample not recovered
- Piezometer tip
- Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

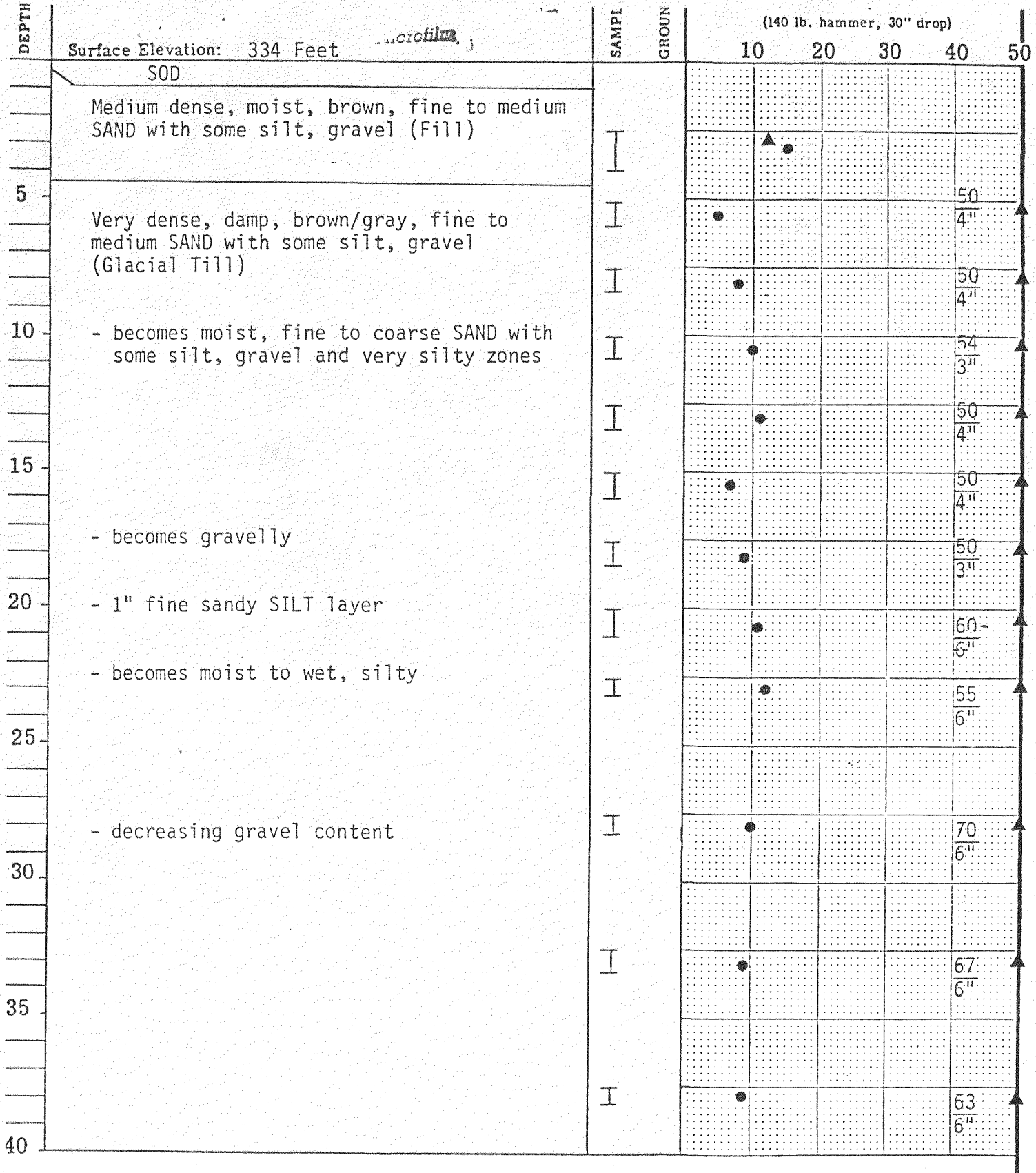
Bob Hope International Heart Research Inst.

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

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY



LEGEND

- [2.0" O.D. split spoon sampler
- I 3.0" O.D. undisturbed sampler
- P Sampler pushed
- Sample not recovered
- Piezometer tip
- Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

Bob Hope International Heart Research Institute

LOG OF BORING NO. B-2

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY

DEPTH, | Surface Elevation: | SAMPLE | GROUND | ▲ Blows per foot (140 lb. hammer, 30" drop) 10 20 30 40 50

Very dense, moist to wet, gray, silty, gravelly, fine to medium SAND (Glacial Till)

45

50

50/4"

50/3"

75/6"

55

Boring terminated at 53.0 feet

Completed 6 June 1983

60

65

70

75

80

LEGEND

- I 2.0" O.D. split spoon sampler
- II 3.0" O.D. undisturbed sampler
- P Sampler pushed
- • Sample not recovered
- Piezometer tip
- ▽ Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

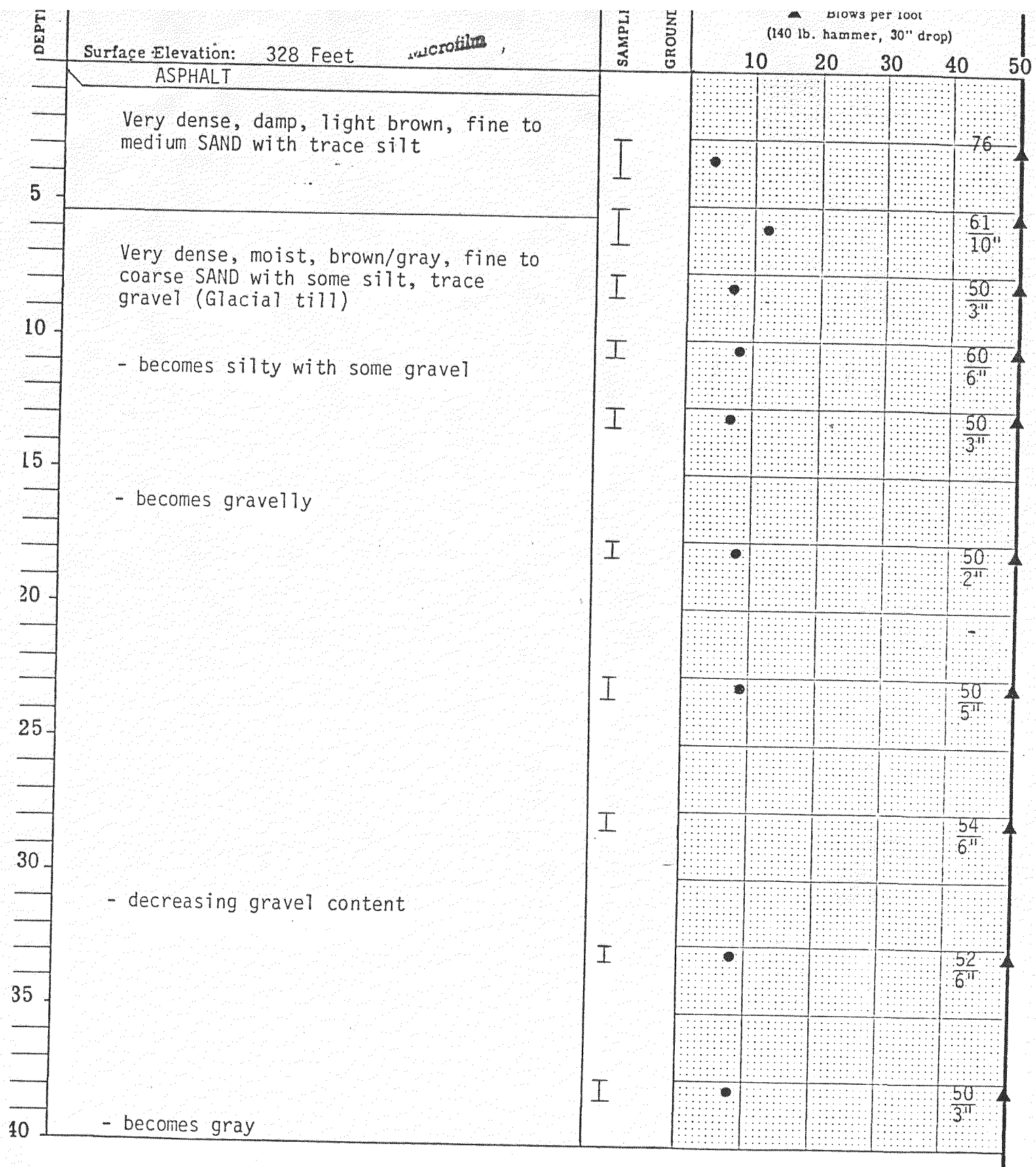
Bob Hope International Heart Research Institute

LOG OF BORING NO. B-2 (cont.)

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY



LEGEND

- [2.0" O.D. split spoon sampler
- I 3.0" O.D. undisturbed sampler
- P Sampler pushed
- Sample not recovered
- Piezometer tip
- Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

Bob Hope International Heart Research Institute

LOG OF BORING NO. B-3

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY

DEPTH | Surface Elevation: | SAMPLE | GROUND | ▲ Blows per foot (140 lb. hammer, 30" drop) 10 20 30 40 50

Very dense, moist, gray, silty fine to medium SAND with trace gravel (Glacial till)

85/6"

56/6"

- 45 -

- 50 -

Boring terminated at 48.5 feet

Completed 8 June 1983

- 55 -

- 60 -

- 65 -

- 70 -

- 75 -

- 80 -

LEGEND

I 2.0" O.D. split spoon sampler
II 3.0" O.D. undisturbed sampler
P Sampler pushed
* Sample not recovered
Piezometer tip
Water level
Atterberg limits: Liquid limit, Natural water content, Plastic Limit
● % Water Content

Bob Hope International Heart Research Institute
LOG OF BORING NO. B-3 (cont.)
W-4011

RITTENHOUSE-ZEMAN & ASSOC.
SOILS ENGINEERING AND GEOLOGY

DEPTH	Surface Elevation: 325 Feet	SAMPLE	GROUN	(140 lb. hammer, 30" drop) 10 20 30 40 50
	ASPHALT			
	Very dense, damp, light brown, fine to medium SAND with trace silt, gravel			50/4"
5	Microfilm			55/6"
	Very dense, damp, brown, fine to coarse SAND with some gravel, trace silt (Glacial till)			53/6"
10	- becomes wet with some gravel, silt and occasional clay and sandy silt lenses			64
				65/10"
15	- becomes moist			55/6"
				60/6"
20	- becomes moist, brown/gray, gravelly fine to coarse sand with some silt			-
				50/4"
25				
				50/8"
30	- becomes silty with some gravel			
				55/6"
35				
	- becomes gray, decreasing silt content			
			▽	70/4"
40				

LEGEND

- 2.0" O.D. split spoon sampler
- 3.0" O.D. undisturbed sampler
- Sampler pushed
- Sample not recovered
- Piezometer tip
- ▽ Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

Bob Hope International Heart Research Institute

LOG OF BORING NO. B-4
W-4011

RITTENHOUSE-ZEMAN & ASSOC.
SOILS ENGINEERING AND GEOLOGY

DEPTH, | SOIL DESCRIPTION | SAMPLE | GROUND | ▲ Blows per foot (140 lb. hammer, 30" drop) 10 20 30 40 50

Surface Elevation:

Very dense, wet to saturated, gray, silty, gravelly, fine to coarse SAND (Glacial till)

(Rock) 60/6"

I

45

Boring terminated at 43.0 feet

Completed 7 June 1983

50

55

60

65

70

75

80

LEGEND

- I 2.0" O.D. split spoon sampler
- II 3.0" O.D. undisturbed sampler
- P Sampler pushed
- * Sample not recovered
- Piezometer tip
- ▽ Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- ● % Water Content

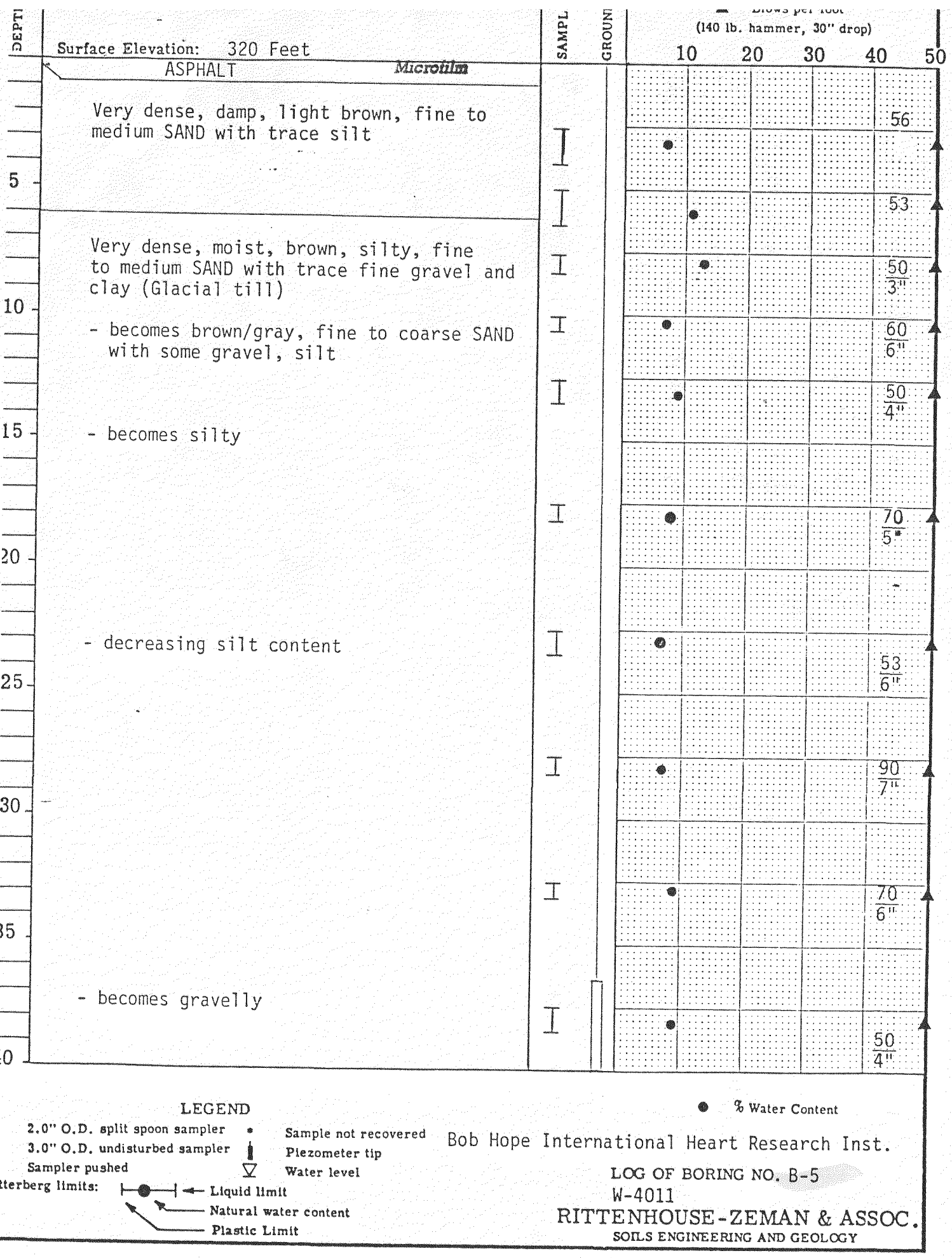
Bob Hope International Heart Research Institute

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

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY



LEGEND

- 2.0" O.D. split spoon sampler
- 3.0" O.D. undisturbed sampler
- Sampler pushed
- Sample not recovered
- Piezometer tip
- Water level
- Atterberg limits: Liquid limit, Natural water content, Plastic Limit
- % Water Content

Bob Hope International Heart Research Inst.

LOG OF BORING NO. B-5

W-4011

RITTENHOUSE-ZEMAN & ASSOC.

SOILS ENGINEERING AND GEOLOGY

DEPTH

Microfilm

Surface Elevation:

SAMPLE

GROUNDWATER

Blows per foot
(140 lb. hammer, 30" drop)

10 20 30 40 50

Very dense, wet, brown/gray, fine to coarse SAND with some gravel (Glacial till)

I

50/4"

45

Boring terminated at 43.5 feet

Completed 8 June 1983

50

55

60

65

70

75

80

LEGEND

I 2.0" O.D. split spoon sampler

II 3.0" O.D. undisturbed sampler

P Sampler pushed

Sample not recovered

Piezometer tip

Water level

Atterberg limits: ← Liquid limit

Natural water content

Plastic Limit

● % Water Content

Bob Hope International Heart Research Institute

LOG OF BORING NO. B-5 (cont.)
W-4011

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SOILS ENGINEERING AND GEOLOGY

SOILS REPORTS

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- [x] Project Location Map / Vicinity Map
- [x] **Site / Exploration Plans, Boring Location Plans**
- [ ] Cross-sections / Subsurface profiles
- [x] **Exploration Logs**
- [ ] Monitoring Well Logs
- [ ] Cone Penetrometer Logs
- [ ] Groundwater Elevation Tables / Data

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- [ ] Missing Data /Illegible Data
  Explanation _____

Comments: _____

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14403 1/2

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740434

Geotechnical Report
Providence 1910 Building Expansion
Swedish Medical Center
Seattle, Washington

February 2003

500 17 Av.

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

Submitted To
Mr. Ralph Hagle
Sabey Corporatio
12201 Tukwila International Boulevard, Suite
Seattle, Washington 98168-512

By
Shannon & Wilson, In
400 N 34th Street, Suite 10
Seattle, Washington 981C

21-1-09747-0C

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GEOTECHNICAL REPORT
PROVIDENCE 1910 BUILDING EXPANSION
SWEDISH MEDICAL CENTER
SEATTLE, WASHINGTON

1.0 INTRODUCTION

This report presents the results of our geotechnical studies for the proposed renovation of the 1910 Building (Regina House) on the Providence Campus of Swedish Medical Center in Seattle, Washington. The purpose of this study is to evaluate the subsurface conditions at the proposed building site and to provide geotechnical engineering recommendations to aid in the design and construction of the proposed structure. This report has been prepared in coordination with the project structural engineer, KPFF Consulting Engineers, to develop specific recommendations for the appropriate foundation and shoring systems. Our work included subsurface explorations, laboratory testing, and engineering studies to develop the recommendations presented in this report. Our work was performed in general accordance with our proposal dated July 29, 2002.

2.0 SITE AND PROJECT DESCRIPTION

The project location is on 18th Avenue between East Cherry Street and East Jefferson Street, as shown on the attached Vicinity Map, Figure 1. The proposed building site consists of the portion of the 1910 Building measuring approximately 80 feet by 185 feet and the administration wing to the west, as shown on the Site and Exploration Plan, Figure 2. The site presently contains a six-story building with various one-story attached wings and paved parking spaces and loading docks.

The ground surface at the site contains paved streets, sidewalks, and small landscaped areas. The topography is generally sloping down to the south from elevation 346 feet at the north end to elevation 340 feet at the south end. The seven-story building within the center the site has a basement-level slab at approximate elevation 338.5 feet. The buildings to the west, north, and south of the proposed new structure also have ground floor slabs at elevation 338.5 feet.

The proposed building will consist of a seven-story structure that will infill the space created by demolition of the 1910 building and surrounding ancillary structures. We understand that the

proposed structure will have interior columns with typical loads of 1,190 kips and a basement level at elevation 325 feet. Excavations for the new construction will extend up to 13 feet below existing floor slabs and will require vertical, shored excavations adjacent to spread footings supporting the existing building. The shoring system currently proposed will include installation of underpinning piles beneath existing footings, preloading those piles to accept column loads, and then proceeding with installation of temporary shoring along three sides of the excavation that abut existing structure. The excavation along 18th Avenue will extend 5 to 9 feet below adjacent sidewalk grade. This excavation will be made using 1 Horizontal to 1 Vertical (1H:1V) slopes in dense granular soils or combinations of 2H:1V slopes in loose fill overlying 0.5H:1V slopes in glacial till.

3.0 GEOLOGY AND GEOLOGIC HAZARDS

The project site is located within the Puget Lowland, a structural trough between the Cascade Range and Olympic Mountains. This trough was subjected to several major glaciations during the Pleistocene Epoch. As a result of these glaciations, the Puget Lowlands were filled to significant depths with glacial and nonglacial sediments. Many of these glacial sediments have been glacially overridden and consolidated to dense to very dense or stiff to hard conditions. The last glaciation experienced by the Puget Lowlands, the Vashon Stade, occurred approximately 13,000 years ago. As the glacier advanced southward sediments were deposited at the base of the ice and overridden (glacial lodgement till). Sometimes the glacial sediments were reworked by sub-glacial streams, forming lenses and layers of sorted sediments. As the glacier receded northward, meltwater streams emanating from the glacial ice deposited stratified layers of sand and gravel as well as lacustrine deposits of silty sand and silts. The native soils at the project site consist of Vashon-age glacial lodgement till. These materials have been glacially overridden and have high shear strength and low compressibility.

Earthquake hazards can include fault-related ground rupture, liquefaction, settlement, and landsliding. Based on the relatively dense nature of the glacially-overridden soils at the site, the gentle topography, and the estimated depth to groundwater, it is our opinion that the risk of liquefaction, settlement, and landsliding at the site is low and, therefore, not considered a design issue for this project. It is also our opinion that there is a low potential for fault-related ground rupture affecting the site. This assessment is based on the fact that the closest, potentially active fault is the Seattle Fault, located about one-quarter mile to the south. While there is evidence

that this fault may have moved about 1,100 years ago, no evidence of surface rupture has been detected in the project vicinity. Additionally, it is generally believed that the recurrence interval for this fault is on the order of thousands of years, much longer than the 500-year event used as a basis for design in the 1997 Uniform Building Code.

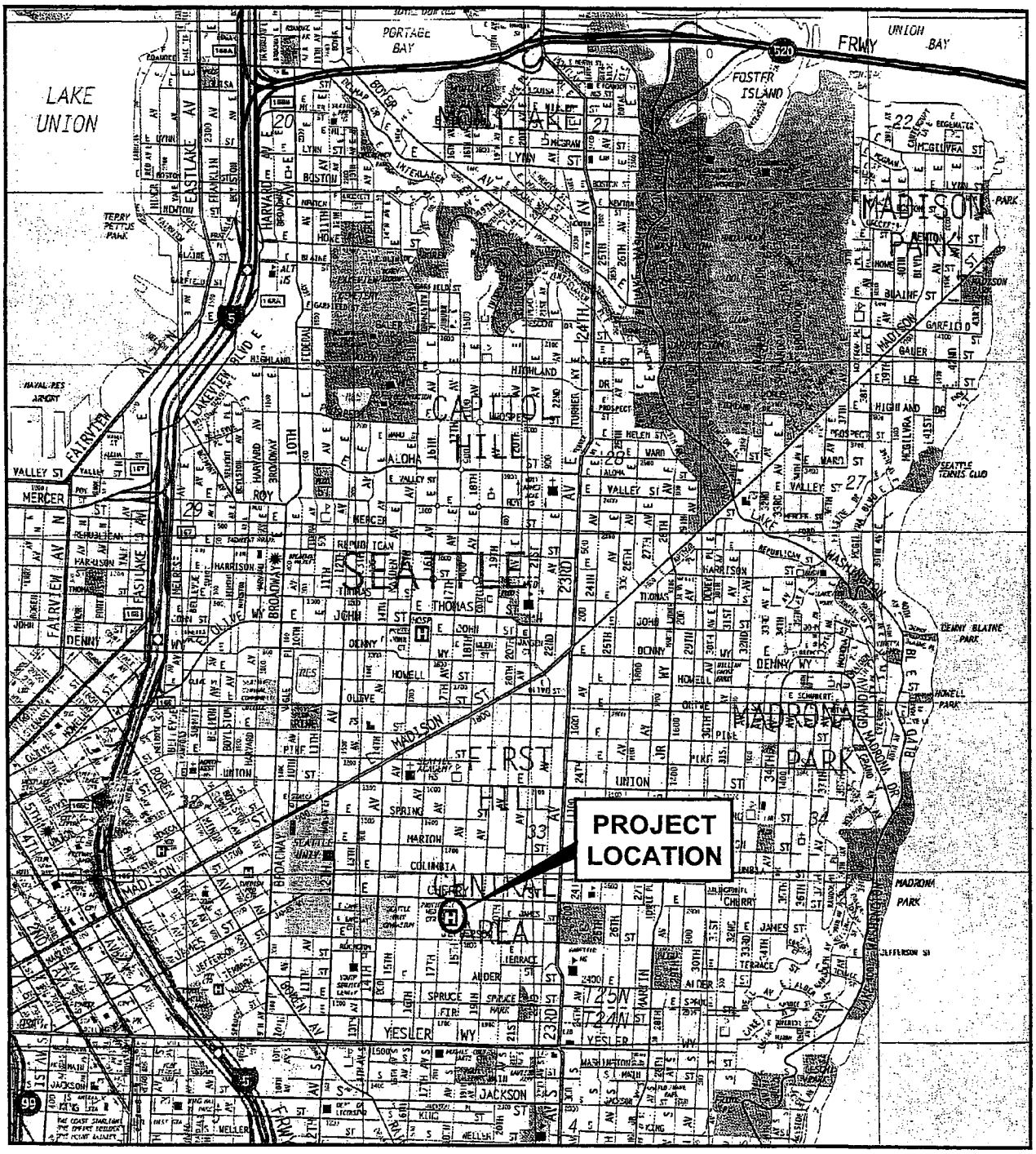
4.0 EXPLORATIONS AND LABORATORY TESTING

Shannon & Wilson completed four borings in August 2002, designated RB-1 through RB-4. The locations of the recent borings are shown on the Site and Exploration Plan, Figure 2. Logs of these borings are presented in Appendix A as Figures A-2 through A-5. A guide to the classification terms used in the boring logs is included as Figure A-1. Previous subsurface explorations were completed near the project site by Shannon & Wilson in 1963, 1976, and 2001, and by Hart Crowser in 1987. Previous explorations relatively near to the project site include those designated B-1, B-3, DH-1, and DH-2, located as shown on Figure 2. Logs of these previous borings are presented in Appendix A as Figures A-6 through A-9.

Our recent soil borings were drilled to depths of 41 to 61 feet (elevations 304.5 to 285.2 feet) by Gregory Drilling, Inc. of Redmond, Washington, under subcontract to Shannon & Wilson, Inc. The drilling was performed on August 2 and 5, 2002. A truck-mounted CME-85 drill rig, equipped with an 8-inch outside-diameter (O.D.) hollow-stem auger, was used.

Standard Penetration Tests (SPTs) were performed at 2.5-foot intervals to a depth of 20 feet and at 5-foot intervals thereafter in each of the recent borings. The SPT consists of driving a 2-inch O.D. split-spoon sampler a distance of 18 inches into the bottom of the borehole with a 140-pound hammer falling 30 inches. The number of blows required to drive the sampler each of three 6-inch increments was recorded, and the number of blows required to cause the last 12 inches of penetration was termed the Standard Penetration Resistance (N-value). This value is an indicator of the relative density and consistency of the soils.

Samples obtained in the field were screened by a technician from our firm for hydrocarbon contamination using a photoionization detector and olfactory sensing. No evidence of contamination was observed or detected. All samples were classified, sealed in jars, and returned to our laboratory where each was visually classified and moisture contents were determined. The results of the SPTs, moisture contents, and soil classifications are summarized on the boring logs, Figures A-2 through A-5. Grain size distribution analysis (American Society



NOTE

Providence 1910 Building
Swedish Medical Center
Seattle, Washington

VICINITY MAP

February 2003 21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 1

File: I:\Drafting\21\09747-001\21-1-09747-001 Fig. 1.dwg Date: 02-26-2003 Author: SAC

APPENDIX A

SUBSURFACE EXPLORATION DATA

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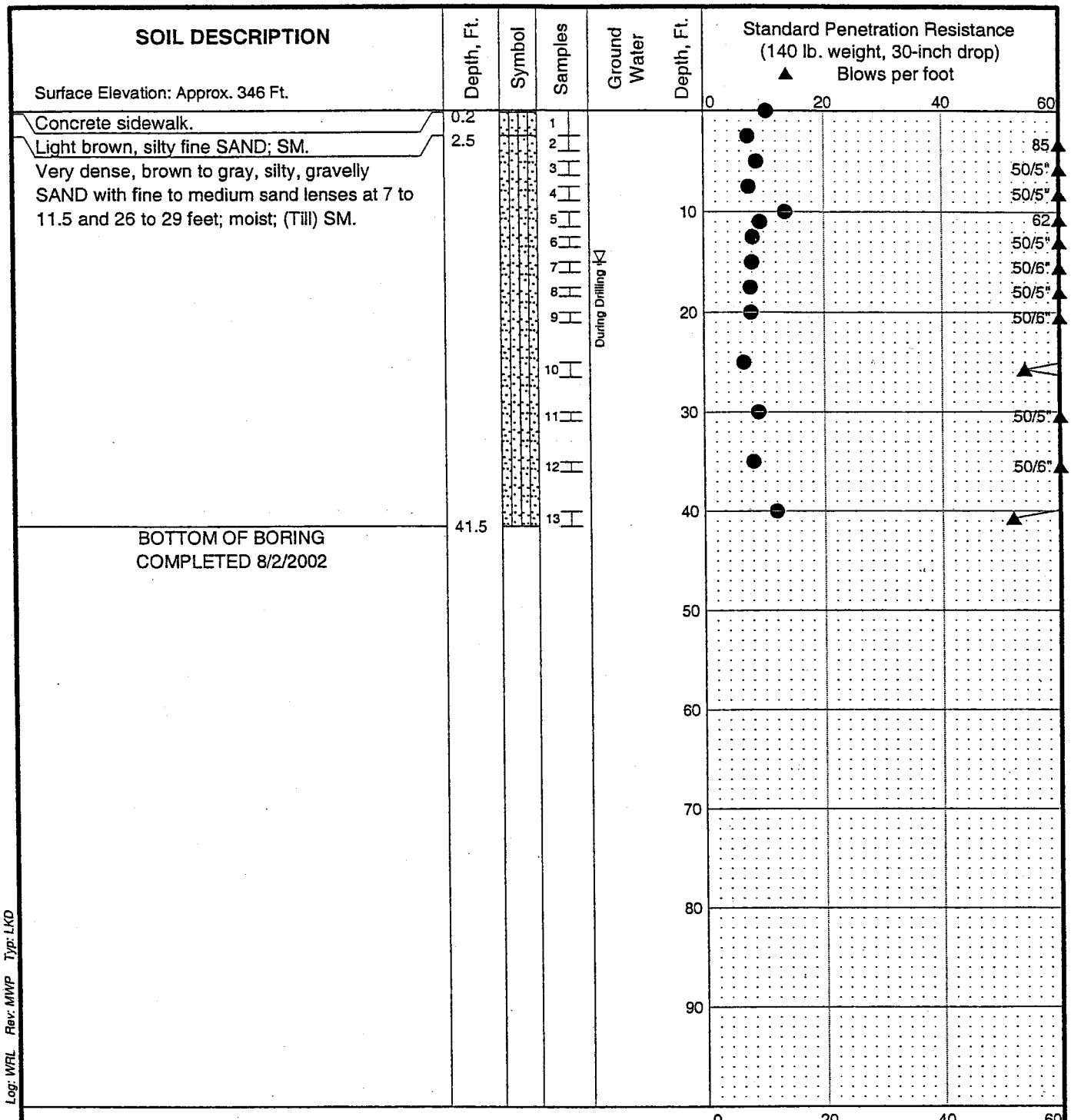


LEGEND

* Sample Not Recovered

Standard Penetration Test

Ground Water Level ATD

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

1910 Building Expansion
Swedish-Providence Campus
Seattle, Washington

LOG OF BORING RB-1

February 2003

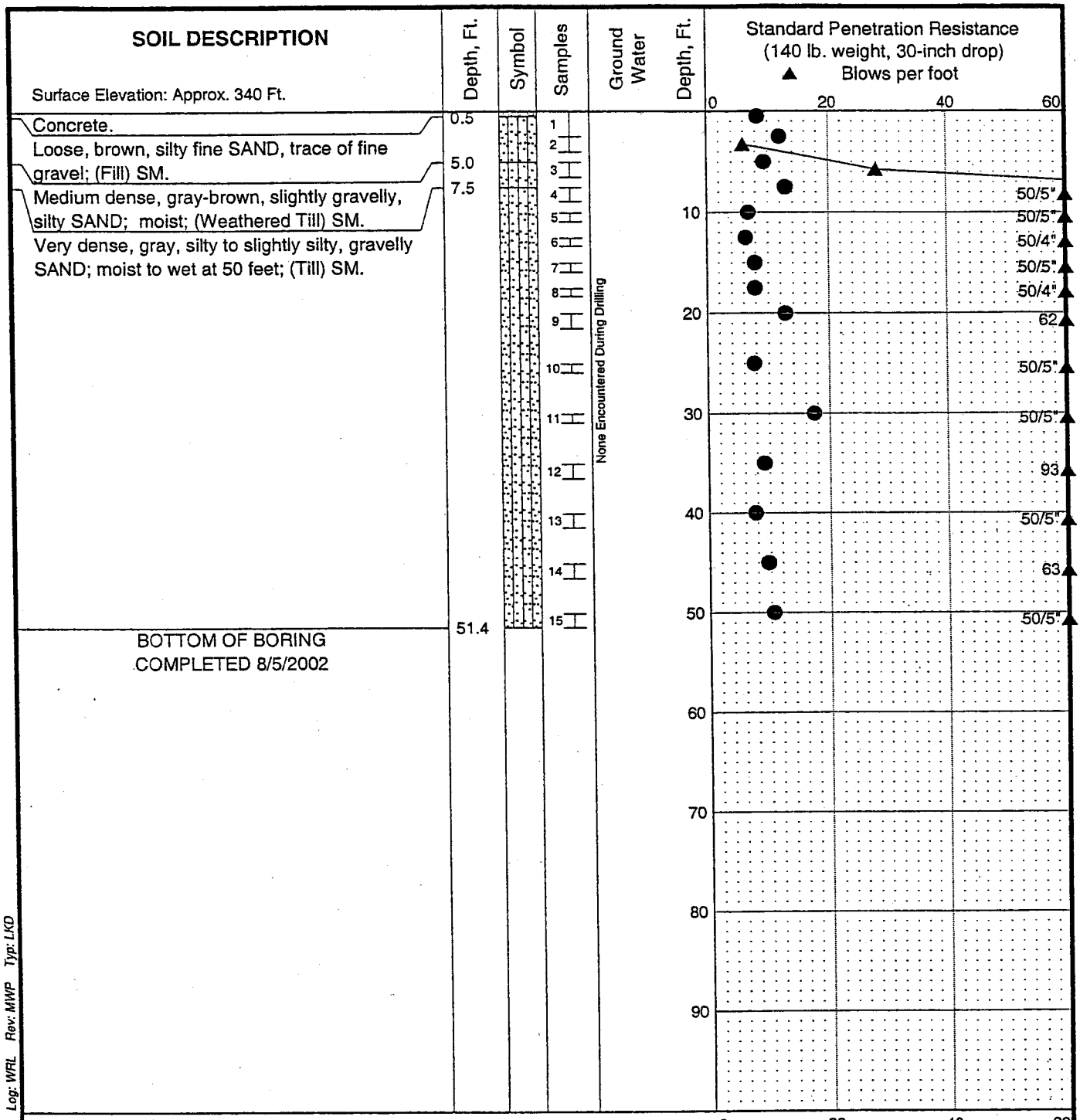
21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2

Log: WRL Rev: MWP Typ: LKD

MASTER_LOG2 21-09747.GPJ SHAN_WIL.GDT 2/25/03



NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

1910 Building Expansion
Swedish-Providence Campus
Seattle, Washington

LOG OF BORING RB-2

February 2003 21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3

Log: WRL Rev: MWP Typ: LKD

MASTER_LOG2 21-09747.GPJ SHAN_WIL.GDT 2/25/03

SOIL DESCRIPTION Surface Elevation: Approx. 346 Ft.	Depth, Ft.
Loose, brown, silty SAND, scattered gravel; moist; (Fill) SM.	3.0
Very dense, gray, silty, gravelly SAND; moist to wet at 40 to 41 feet; slightly silty, fine to medium sand lenses from 10 to 12 feet; (Till) SM.	
BOTTOM OF BORING COMPLETED 8/5/2002	60.8

Symbol

Samples: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17

Ground Water Depth, Ft.: None Encountered During Drilling

Standard Penetration Resistance
(140 lb. weight, 30-inch drop)
▲ Blows per foot

Depth	Blows per foot
0	20	40	60
3	50/5"
4	50/5"
7	50/5"
8	50/5"
9	50/5"
10	50/6"
13	85
20	50/4"
23	50/4"
27	50/6"
30	82
33	50/5"
37	72
40	50/4"

Depth scale: 10, 20, 30, 40, 50, 60, 70, 80, 90

0 20 40 60

LEGEND

* Sample Not Recovered

I Standard Penetration Test

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

1910 Building Expansion
Swedish-Providence Campus
Seattle, Washington

LOG OF BORING RB-3

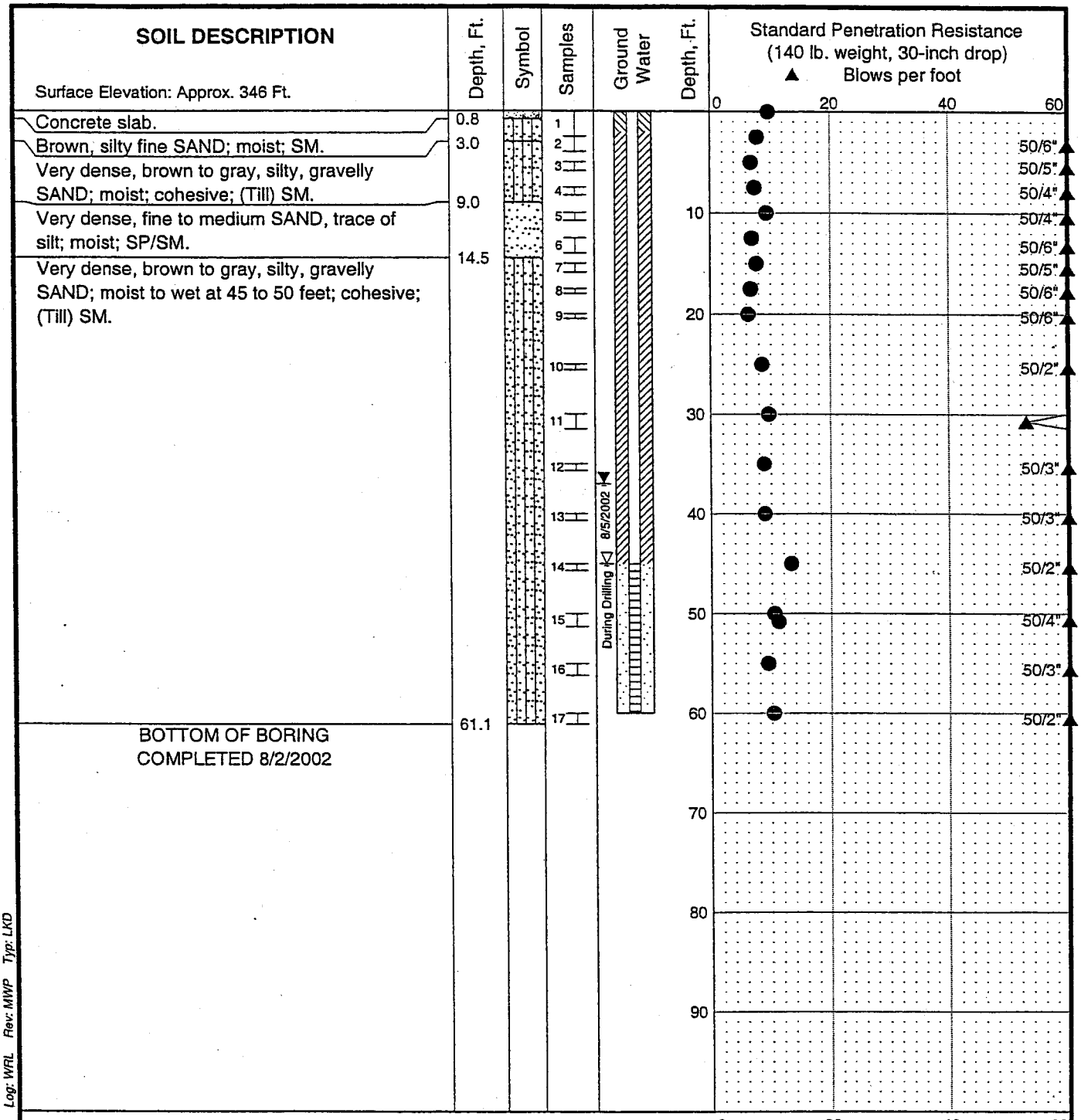
February 2003 21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4

Log: WRL Rev: MWP Typ: LKD

MASTER LOG2 21-09747.GPJ SHAN WIL.GDT 2/25/03



LEGEND

- * Sample Not Recovered
- I Standard Penetration Test
- Piezometer Screen and Sand Filter
- Bentonite-Cement Grout
- Bentonite Chips/Pellets
- Bentonite Grout
- Ground Water Level ATD
- Ground Water Level in Well
- ● % Water Content
- Plastic Limit ⊢●⊣ Liquid Limit
- Natural Water Content

NOTES

1. The boring was performed using drilling methods.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. Refer to KEY for explanation of symbols, codes and definitions.
6. USCS designation is based on visual-manual classification and selected lab testing.

1910 Building Expansion
Swedish-Providence Campus
Seattle, Washington

LOG OF BORING RB-4

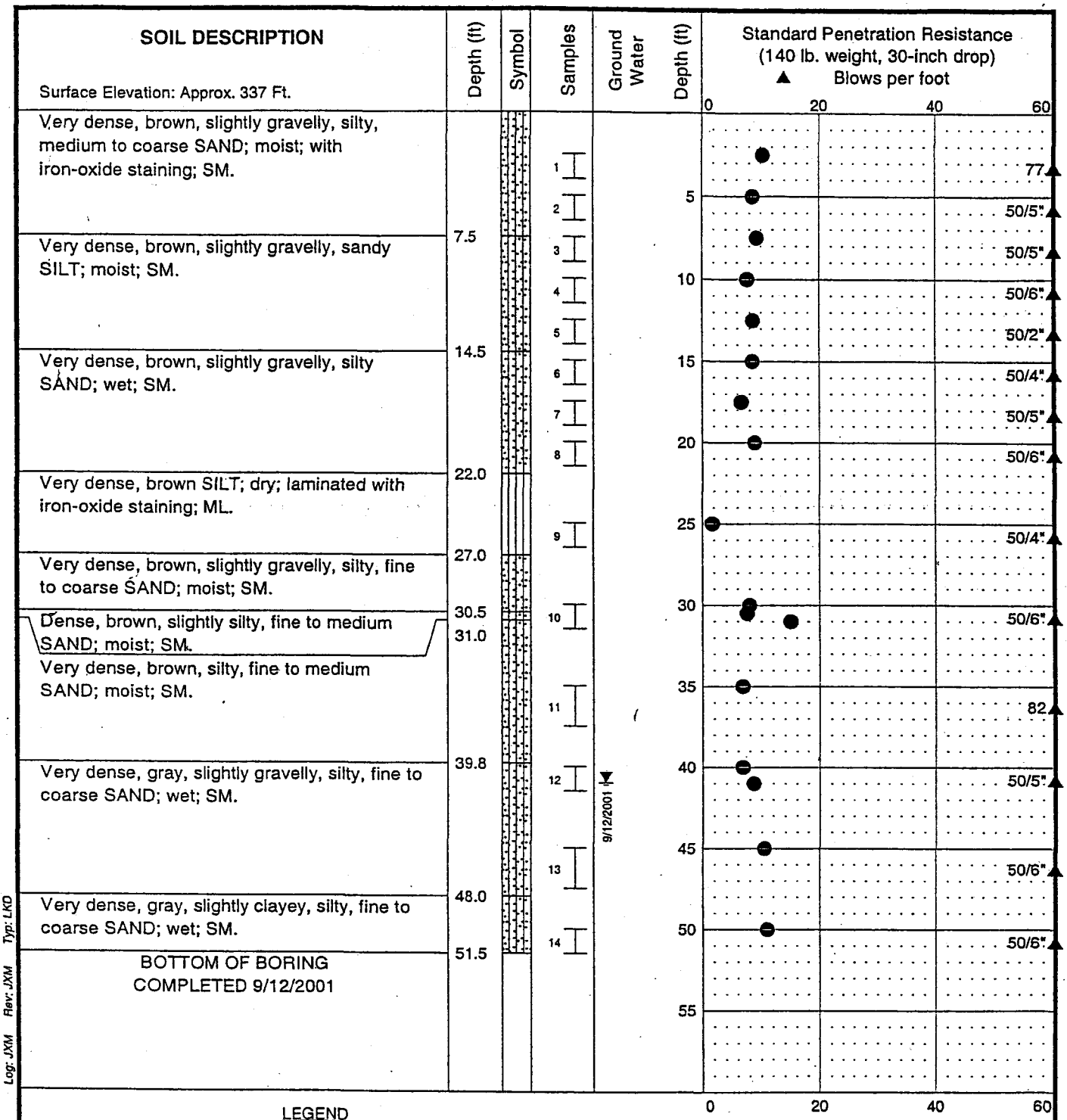
February 2003 21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-5

Log: WRL Rev: MWP Typ: LKD

MASTER_LOG2 21-09747.GPJ SHAN_WIL.GDT 2/25/03



NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
3. Groundwater level, if indicated above, is for the date specified and may vary.
4. Refer to KEY for explanation of "Symbols" and definitions.
5. USCS designation is based on visual-manual classification and selected laboratory index testing.

Swedish Medical Center Providence Campus
Replacement Chimney Project
Seattle, Washington

LOG OF BORING B-1

October 2001 21-1-09486-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-6

MASTER_LOG 21-09486.GPJ SHAN_WIL.GDT 10/3/01 Log: JXM Rev: JXM Typ: LKD

Boring Log B-3

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet 343

Loose, moist, brown, slightly silty, slightly gravelly to gravelly SAND. (FILL)

Very dense, damp, gray, gravelly, very silty SAND. (TILL)

- Samples indicate variable silt and gravel contents.
- Drill action indicates 1-foot-zone of water.
- Grades dark gray.
- Drill action indicates cobbly zones.

Bottom of Boring at 60.0 Feet.
Completed 11/24/87.

Depth in Feet: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

ATD

Sample: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11, S-12

STANDARD PENETRATION RESISTANCE

▲ Blows per Foot

Sample	Blows per Foot
S-3	50/6"
S-4	50/3"
S-5	58/6"
S-6	50/5"
S-7	79/11"
S-8	70/1"
S-9	50/3"
S-10	58/6"
S-11	50/4"
S-12	50/3"

LAB TESTS: GS, GS

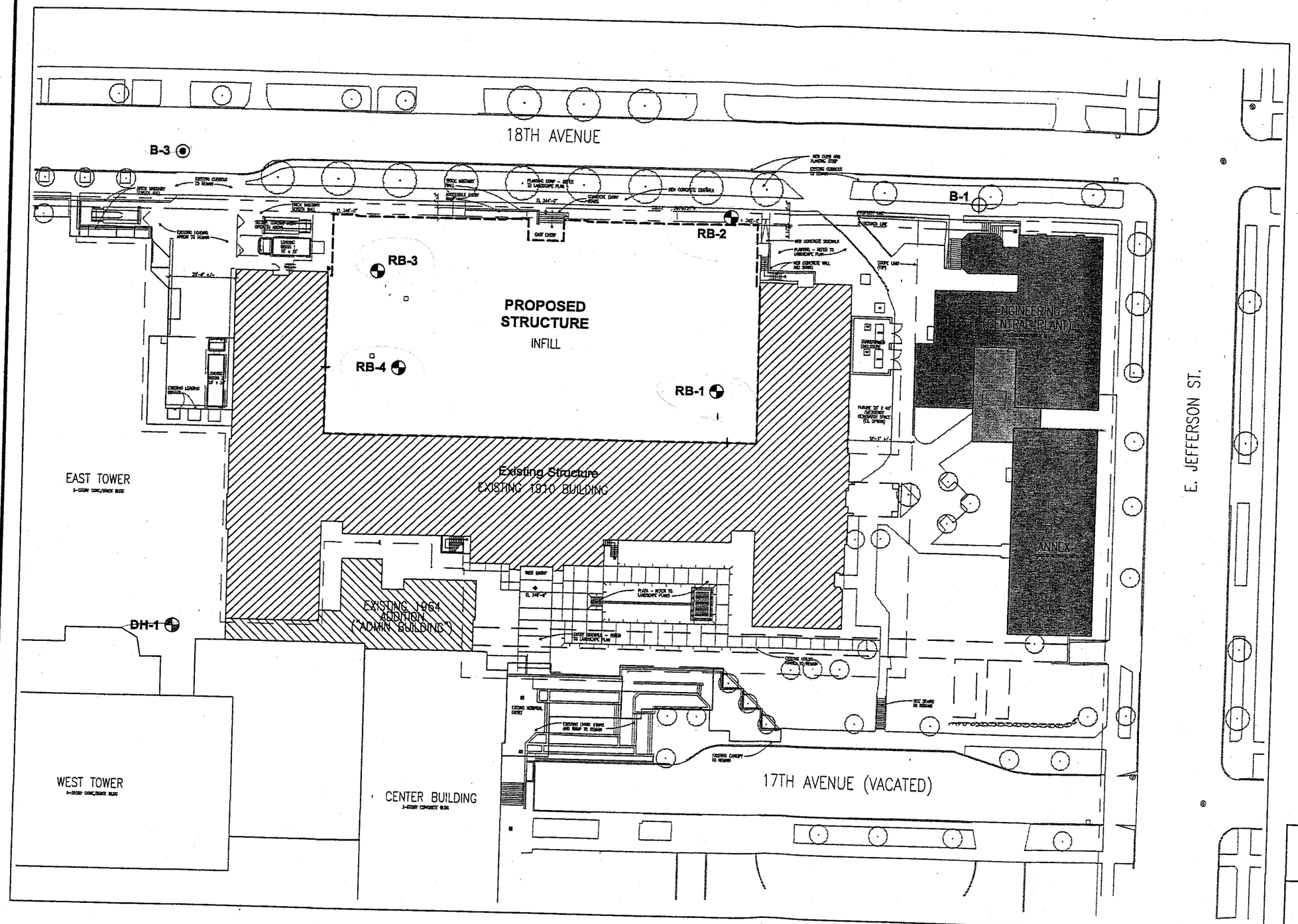
● Water Content in Percent

1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2071 November 1987

HART-CROWSER & associates, inc.

Figure A-7



N

0 50 100

Scale in Feet

LEGEND

RB-1 Soil Boring Designation and Approximate Location (Shannon & Wilson, Inc., 2002)

B-1 Soil Boring Designation and Approximate Location (Shannon & Wilson, Inc., 2001)

DH-1 Soil Boring Designation and Approximate Location (Shannon & Wilson, Inc., 1963)

B-3 Soil Boring Designation and Approximate Location (Hart Crowser, 1987)

NOTE

Base map taken from electronic file, 1910-a-007_sht.dwg, "Site Plan" prepared by Callison, dated 1-6-03.

Providence 1910 Building
Swedish Medical Center
Seattle, Washington

SITE AND EXPLORATION PLAN

February 2003 21-1-09747-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

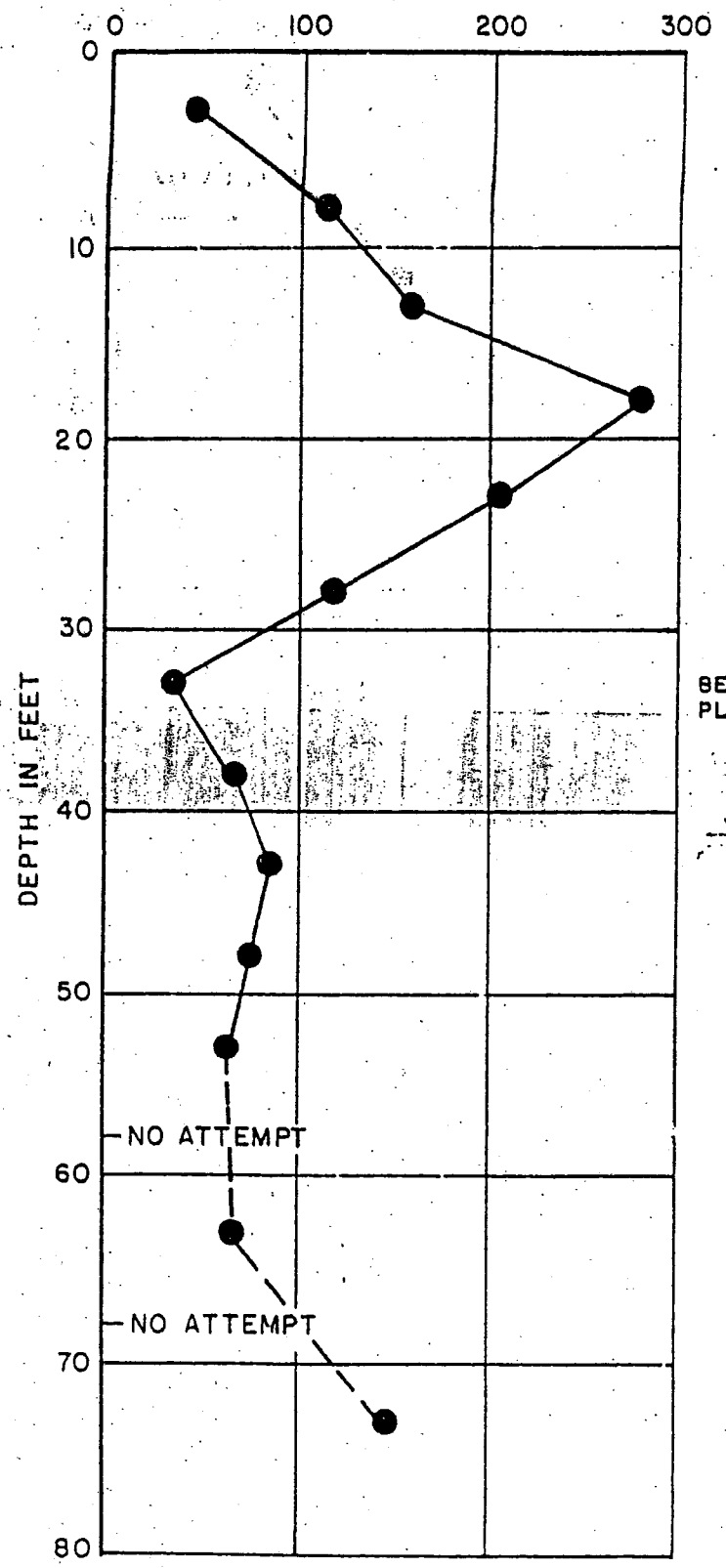
FIG. 2

File: I:\Drafting\21\09747-001\21-1-09747-001 Fig. 2.dwg Date: 02-28-2003 Author: SAC

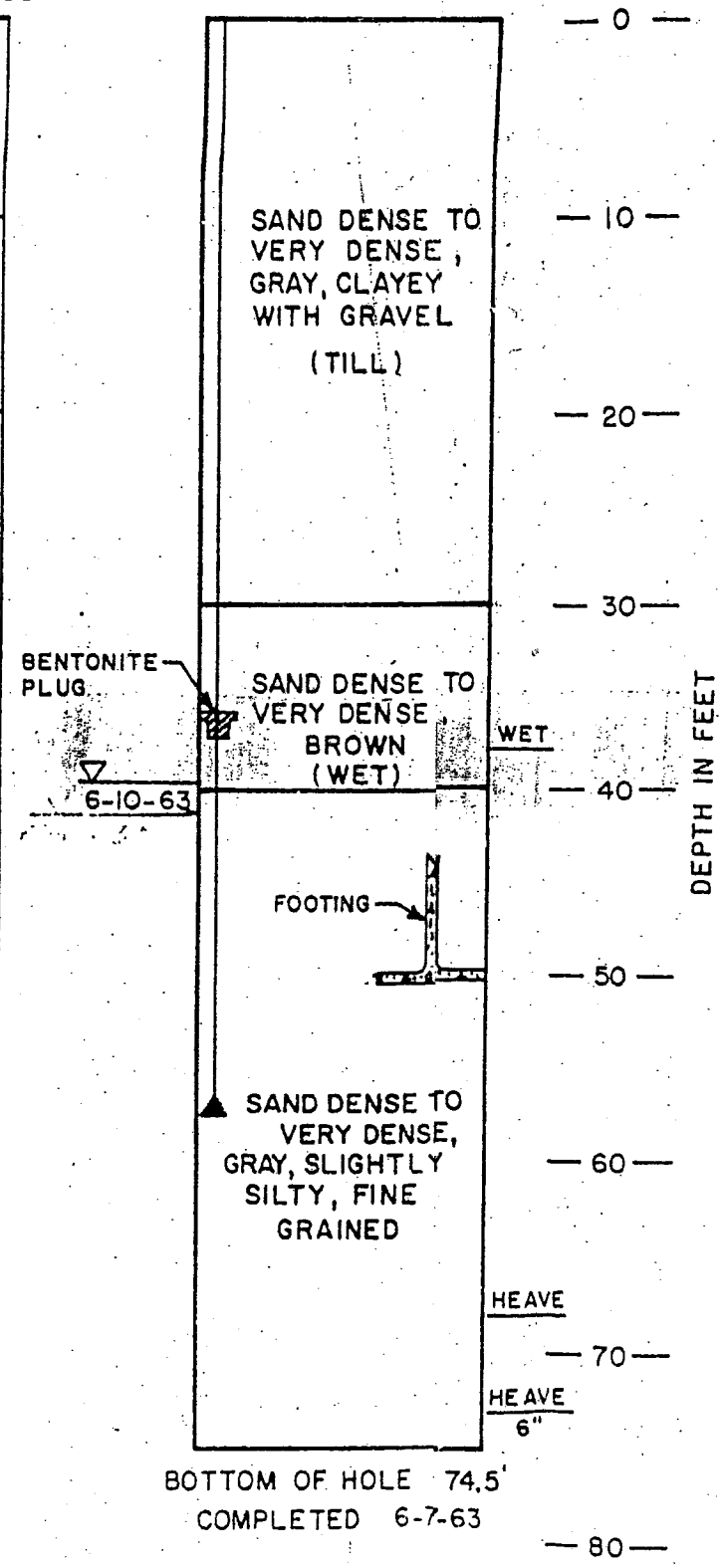
W-307

(9)

PENETRATION RESISTANCE
(BLOWS PER FOOT)

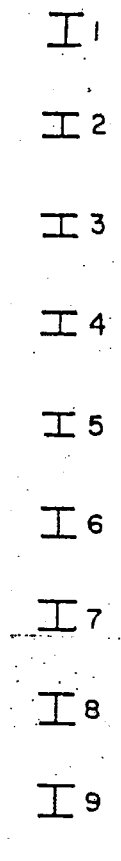


BORING LOIG
DH—I
SURFACE ELEV. ~~350.0~~ 344.0'
APPROX.



BOTTOM OF HOLE 74.5'
COMPLETED 6-7-63

SAMPLE



LEGEND

PENETRATION RESISTANCE

6 2" O.D. STANDARD PENETRATION TEST SAMPLE. NUMBER TO THE RIGHT INDICATES SAMPLE NUMBER.

STATIC WATER LEVEL DETERMINED BY PIEZOMETER INSTALLATION.

PIEZOMETER INSTALLATION

PROVIDENCE HOSPITAL ADDITION

DRILL HOLE - I

W-63-209 JUNE, 1963

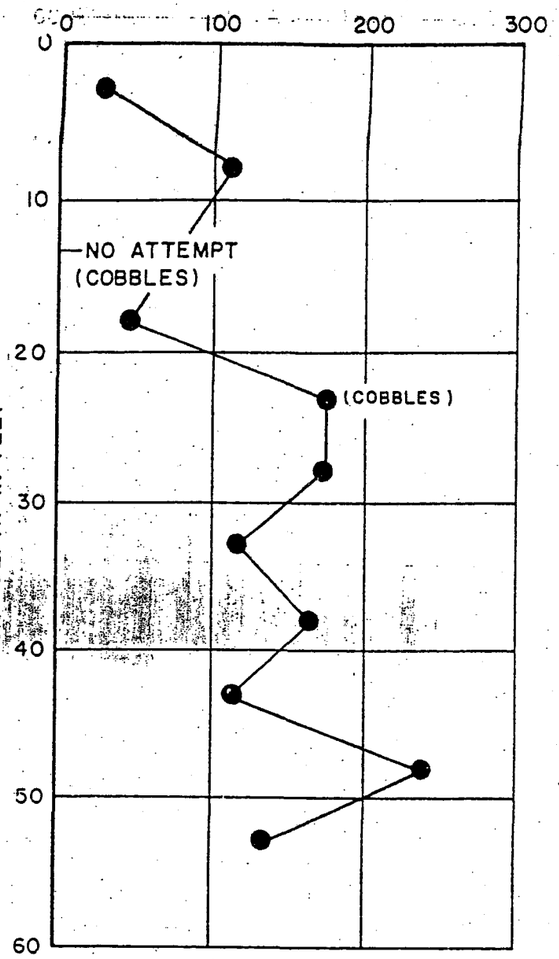
Shannon and Wilson
Soil mechanics and foundation engineers
Seattle

FIGURE 48

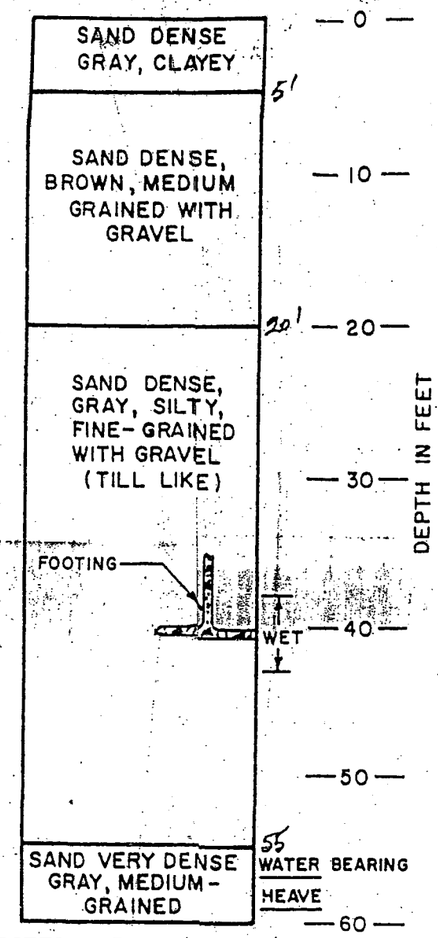
W-307

10

PENETRATION RESISTANCE
(BLOWS PER FOOT)

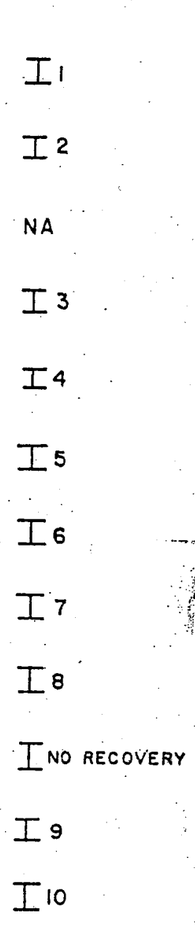


BORING LOG
DH-2
El. 339



BOTTOM OF HOLE 59.5'
COMPLETED 6-10-63

SAMPLE



LEGEND

PENETRATION RESISTANCE

5 2" O.D. STANDARD PENETRATION TEST SAMPLE. NUMBER TO THE RIGHT INDICATES SAMPLE NUMBER.

PROVIDENCE HOSPITAL ADDITION

DRILL HOLE - 2

W-63-209 JUNE, 1963

Shannon and Wilson
Soil mechanics and foundation engineers
Seattle

FIGURE 4-9

J. Scott Kindred is a Hydrogeologist
- Bachelors degree in Geology from Brown University
- Masters degree in Civil Engineering from M.I.T.,
- Registered professional engineer in the State of Washington.

Focused on groundwater hydrology, contaminant fate and transport, and numerical modeling.

Stormwater infiltration with a focus on low impact development. (A more natural hydrologic cycle)

Over the years, Scott has worked on stormwater planning and retrofit, environmental site remediation, water supply, mining, master planned developments, residential and commercial development projects.

Different from a geotechnical engineer in that a geotechnical engineer focuses mostly on soil/slope stability and interaction with build structures. Hydrogeologist look at flow of water through soil and rock.

Geotechnical engineers come to a hydrogeologist to find out about water tables and for help with design issues.

Exhibit 3: Kindred Hydro website

Services:
- Stormwater infiltration testing and design
- Wastewater drainfield assessment
- Groundwater characterization and testing
  - King Co. engaged him for Capitol Hill. for characterization. Looking at green over/ outflows. (From N. Capitol Hill Cloah St. to Swerard Park. Near Lake Washinging and to Downtown on the west. All the way over to the Duwamish river) Non-public draft. He is working with HDR on this. The report has also been reviewed by Aspect Consulting.
- Groundwater modeling
  - Data from borings and wells
- Low Impact Development (LID) design support
- Stormwater retrofit design support
- Underground injection control (UIC) wells for stormwater

- Utilizing vactor equipment for subsurface exploration and testing that minimize site disturbance and reduce costs and “potholing” to identify utilities.
- Large vacuum mounted on a truck to clean out segments in manholes and
- Implementing LID at challenging sites (e.g., tight soils, high groundwater, steep slopes)
- Solving flooding and drainage issues associated with shallow groundwater
- Optimizing LID designs to maximize effectiveness and lower costs

- Evaluating potential groundwater impacts resulting from stormwater infiltration

Written Instructions: Contract - Perform a **desktop assessment** and Review of EIS and any geotechnical information and other data he was able to obtain and provide an opinion on potential impacts from ground water and potential issues related to ground and storm water to the neighborhood. Contact covers 10 hours approx. Complete except for testimony. Vicky will send a copy of the contract

Verbal instructions: Clarification on what he was to testify to. Also talked about issues related to sump pumps and surface water run off and flooding of intersections. Others will provide this testimony as he does not have direct knowledge.
He has not visited the site previously but he has been all over the neighborhood as part of other work.

No boring or Vactoing was done.

No photos taken.

No written report done or expected.

Was able to use previous work for King County to support this work. Boring logs come from Dept of Natural resources geotechnical database.

Opinion:
(No?) Determination as to wether the EIS was adequate or in adequate - Has concerns on the groundwater language in the EIS.

Primarily utilization of green stormwater solutions such as rain gardens including groundwater infiltration that increases the amount of water going into the groundwater. Flooding in basements & sump pumps.

Additional consideration needed above and beyond what is in the code and manuals due to groundwater consideration Flooding and sump pump operations

Q: Will the proposal make the situation worse?
A: Green rainwater infrastructure and low impact development as documented in the code would make the situation worse.

The range of projects in the development of the campus could be implemented in a way that could reduce the groundwater concerns.

Exhibit 4: Notes and talking points

Exhibit 5 page one of Cherry Hill Figures - Exhibits 5,6 & 7.pdf

B is parallel to Cherry Street and is the campus. - Shows stormwater infiltration This was prepared before he was engaged by the neighborhood group..

Exhibit 6 is page 2 of Cherry Hill Figures - Exhibits 5,6 & 7.pdf

Exhibit 7 is page 3 of Cherry Hill Figures - Exhibits 5,6 & 7.pdf
Cross section shows the campus is between 16th and 19th. Boring indications on the cross section are a summarization of one or more reports and not a specific boring.

He did not make these borings, reports are not always obvious and require interpretation.

The level of detail on exhibit 7 is less then what would be done for a transit tunnel.

Some of the borings go back 30 or 40 years.

Purple line is the Vashon Glacial Till (VGT). Upper is ground surface elevation Vashon Advance Outwash (VAO).
Hyphenated light blue area is the water table elevation. Potentiometric surface in the advance outwash aquifer shows the pressurization in the water table.

Q: If you drill down to 275 would you find water?
A: Some assumptions have been made based on detail shown the potentiometric surface in the VAO. Based on judgement, not data, he thinks you would find water at 260 feet.

Q: You don't normally find water in Vashon glacial till?
A: You often do but it is in pockets, water flows very slowly in VGT

Exhibit 4:
Green stormwater infrastructure (GSI) also equivalent to/referred to as low impact development. Using GSI where there is VGT can result in more surface ground water.

Some geotechnical firms don't have all the necessary data and expertise to identify these impacts. If you use other retention facilities(tanks) then GSI then the problem goes away.

Recommends that you prevent infiltration on the site. Rain gardens are a bad idea.

Should line facilities and eliminate the risk of stormwater infiltration.

Fixing existing stormwater system issues has been identified in the EIS (Storm water in intersections) not clear if it is maintenance or capacity related.

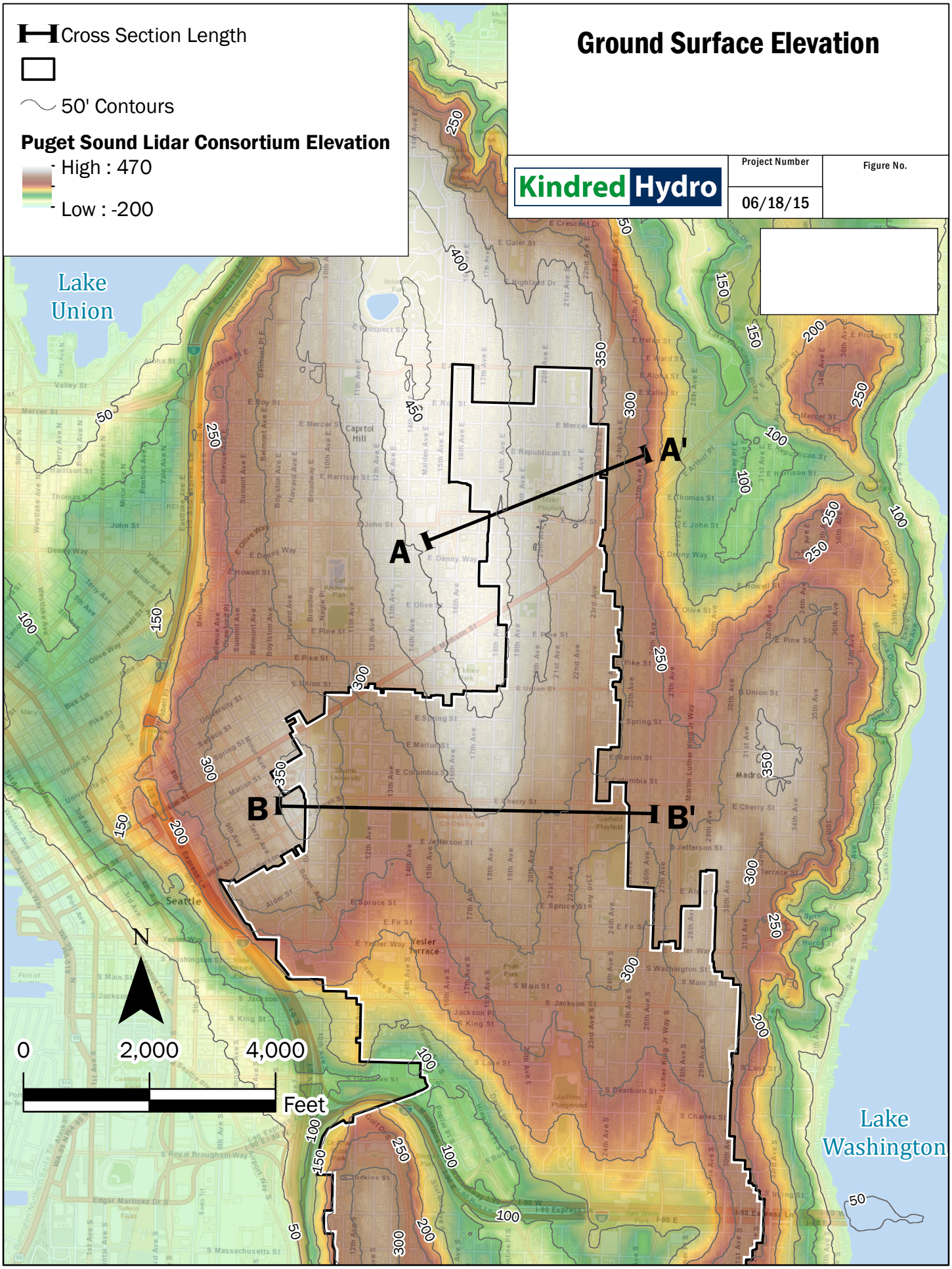
Exhibit 8: is Map of DNR Report Locations Exhibit 8.pdf Shows B parallel on page one of Exhibit 5. Shows where borings were done and also shows notes and other data.

Recommendation: Swedish and Sabey should not be green. Will result in runoff and higher groundwater infiltration.

Infiltration on Glacial Till - Exhibit 9.pdf - General demonstration of what happens in areas with glacial till. This was not prepared for this testimony specifically.

Brought in on Ballard rain gardens when they started having problems resulting in wet basements requiring sump pumps.

Deep drains can mitigate VGT infiltration this but it does not seem that deep drains are feasible at Cherry Hill because the amount of till. First boring showed it may only be 30 feet deep but additional borings show that is not the case. Since only one spot has a boring that shows you can do deep infiltration. **Odds are 10% or less that would would be able to use deep drains. Retention tanks are the only viable option.**

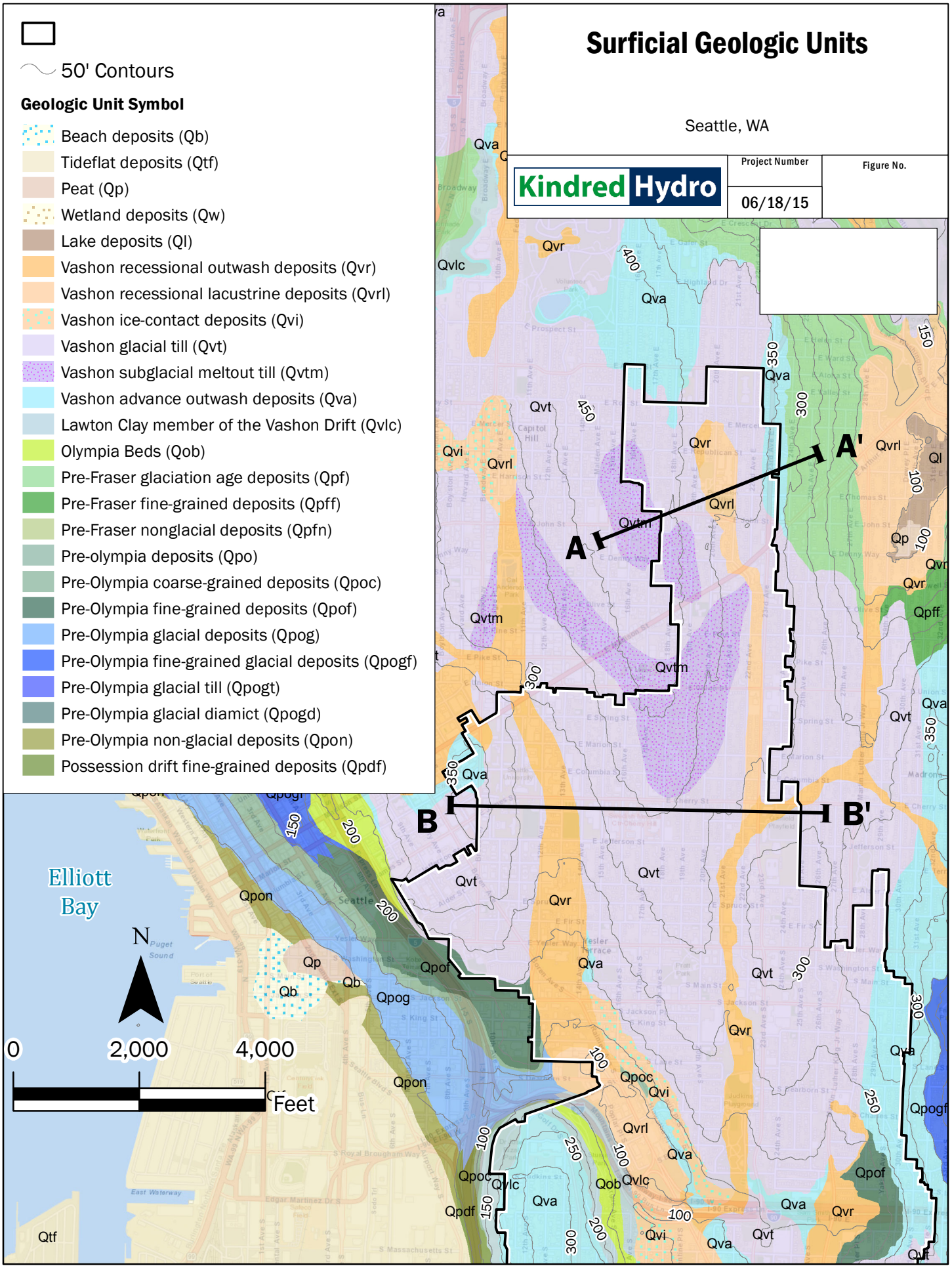

Cross Section Length
50' Contours
Puget Sound Lidar Consortium Elevation
High : 470
Low : -200
Ground Surface Elevation
Kindred Hydro
Project Number
06/18/15
Figure No.
A
A'
B
B'
Lake Union
Lake Washington
Seattle
Capitol Hill
Yesler Terrace
N
0
2,000
4,000
Feet

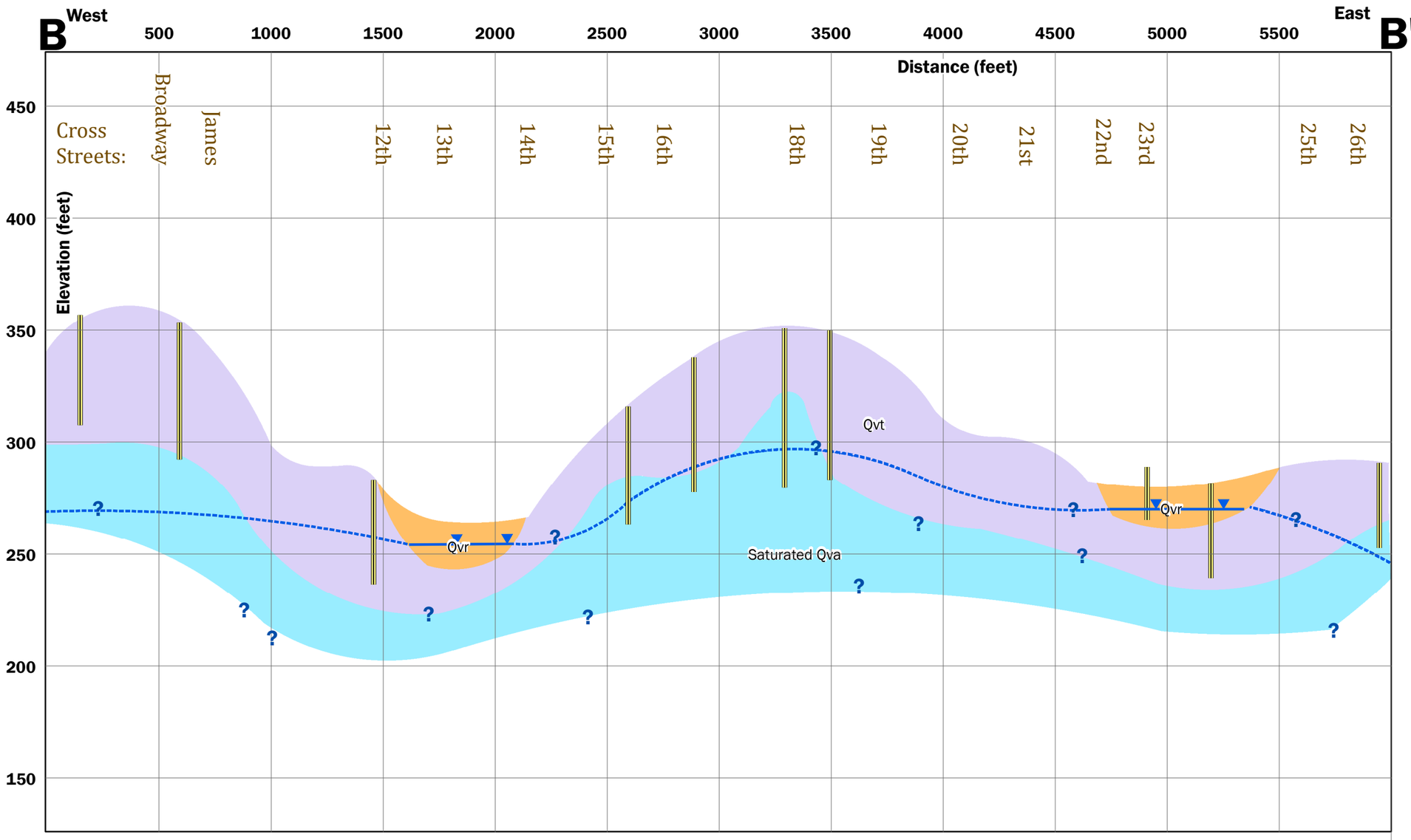
Surficial Geologic Units

Seattle, WA

Kindred Hydro

Project Number	Figure No.
06/18/15	





Boring

Approximate Water Table Level in Recessional Outwash

Potentiometric Surface in the Advance Outwash Aquifer

Geologic Unit Symbol

Vashon recessional outwash deposits (Qvr)

Vashon glacial till (Qvt)

Vashon advance outwash deposits (Qva)

Due to the limitation of data, the contacts between geologic units should be considered approximate.

Question marks indicate where the water table and geologic unit contacts were inferred based on best professional judgement

Cross Section B-B'

Kindred Hydro

Project Number	Figure No.
06/18/15	

Attempting to Exclude Expert Testimony

Because the use of expert witnesses at trial is increasing, it comes as no surprise that attempts to exclude expert testimony are also increasing.

The first and most common is a motion in limine, often made before the trial or before the expert witness testifies. In a motion to the court, the attorney attempts to make a clear and convincing argument that the witness is unqualified to render his or her opinion. The second approach, often combined with the motion in limine, is to move for a voir dire examination of the expert.

Voir dire is a legal phrase referring to an oath to tell the truth (Latin *verum dicere*), i.e., to say what is true, what is objectively accurate or subjectively honest, or both. A voir dire examination is really a diminutive cross-examination in an attempt by the opposing counsel to expose an expert's lack of qualifications on the area about which the expert intends to offer opinion testimony. In other words, a voir dire examination allows the opposing attorney to interrupt the direct examination and conduct, in part, his cross-examination.

The right to conduct voir dire examination is at the discretion of the court and may be accepted or rejected. It is important to note that the voir dire examination is very limited in its range. Questioning must be only about the expert's lack of qualifications to render a meaningful opinion to the trier(s) of fact. Following voir dire, the attorney may make a motion to disqualify the witness from testifying due to inadequate qualifications in the field in which the expert claims to be qualified.

Attorneys facing a strong expert may use one or both methods in a tactical attempt to get the expert's testimony and/or report excluded before trial even begins. For instance, during deposition of the expert, the opposing counsel can evaluate the strength, demeanor, and charisma of the expert. Equally important, the opposing attorney will examine in detail the expert's report. When the expert's report is professional, organized and accurate, and includes the necessary components such as the expert's CV, list of cases, index, list of documents received and reviewed, discovery exhibits and demonstrative evidence and forms a strong, clear and supported opinion and conclusion, the opposing counsel knows he or she is facing an uphill battle in court.

In defense of both the motion in limine and voir dire examination rules, the intent is to ensure the expert is qualified to opine in the area of expertise in which she claims to be experienced and qualified. After all, the purpose of the expert is to educate the trier(s) of fact -- the jury or the judge -- based on the expert's experience, certifications and education.

As a hypothetical example of how such motions work, an expert was retained to opine on the condition of an outdoor concrete floor that allegedly was spalling and breaking up, causing an individual to fall and be injured. The expert wanted to take samples of the concrete so it could be scientifically analyzed. The opposing attorney made a motion

to the court to prevent the taking of samples of the concrete. The court granted the motion and the expert was prohibited from taking samples to be scientifically analyzed.

The expert reverted to a photographic video and simplistic testing by light sweeping of the concrete on site to show that the pebbles, concrete, dust and other particles would easily become dislodged.

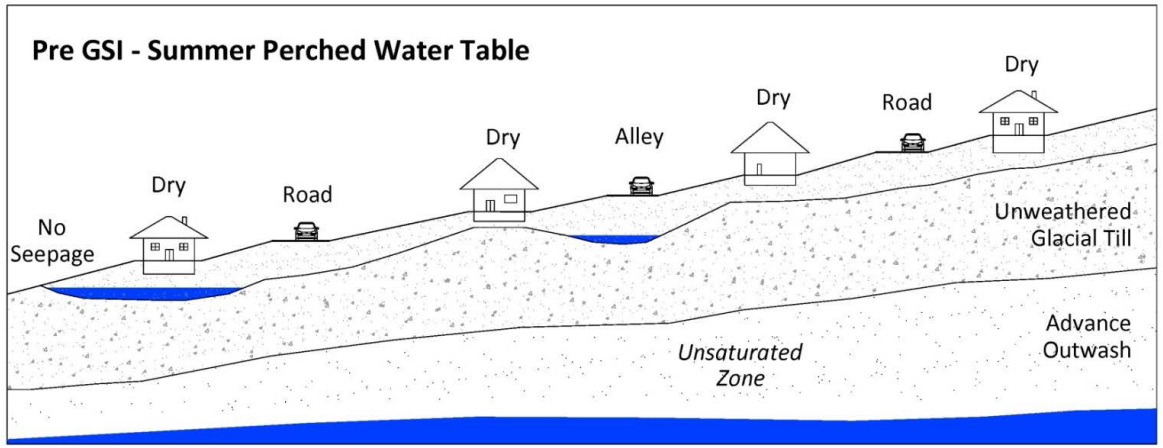
The opposing attorney later filed a motion in limine to exclude the expert's report based in part on an assertion that the expert did not provide any scientific basis for his opinion and/or conclusion.

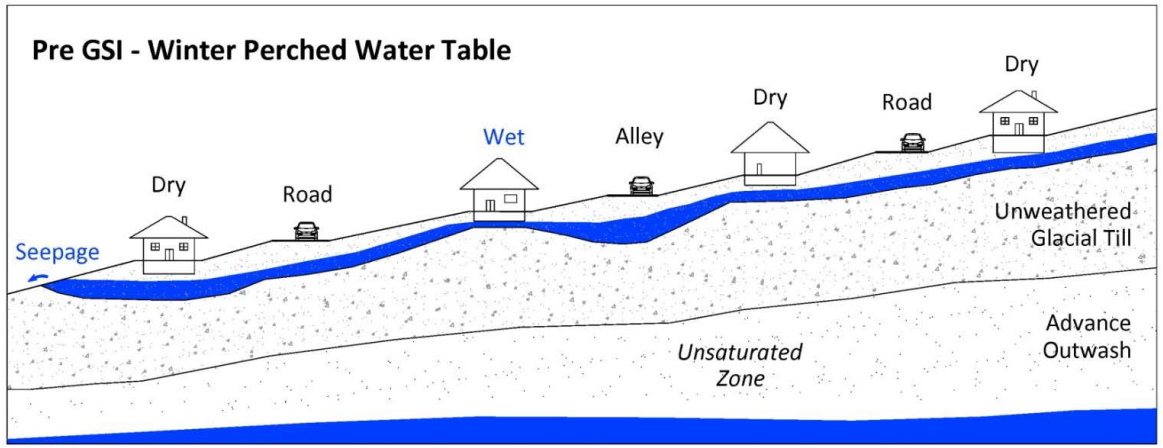
In this example, the attorney was successful, preventing the expert from performing scientific testing and providing the respective results. Then, after the expert was resourceful in providing other forms of testing to reveal the condition of the concrete, the attorney attempted to again exclude the expert's report because there was no scientific evidence. As absurd as this seems to people outside the legal system, in this case the attorney used the rules to his advantage in an attempt to get a strong, resourceful expert's report excluded.

As shown, these rules can be used to eliminate even strong experts from testifying in court and/or from having their reports being entered into evidence. It needs to be noted that in my experience this strategy is often unsuccessful and the qualifications and report of strong experts will prevail.

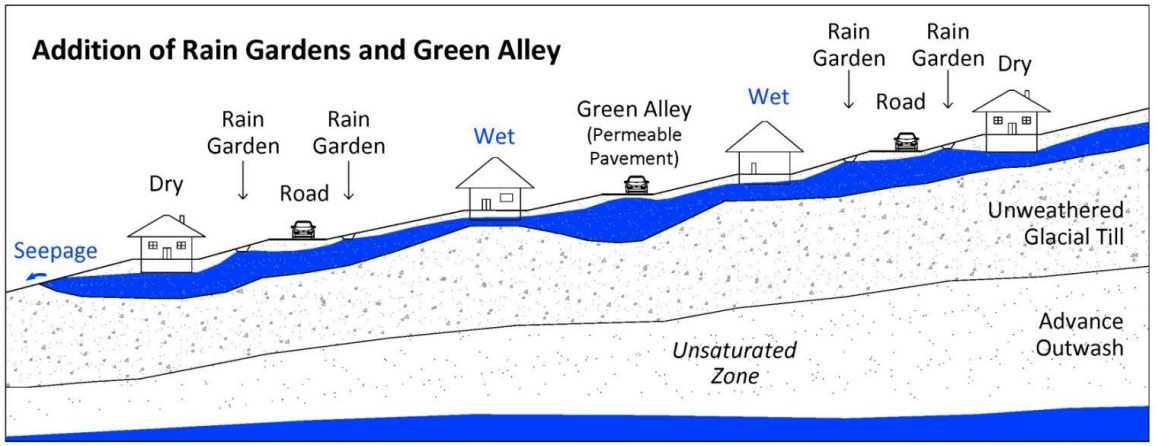
William Gulya, Jr., President & CEO, Middlesex Trenching Company for more than 35 years, specializes in excavation & construction site preparation – earthwork and grading, water mains, sewer installation, trenching, containment, underground utilities, dike repair, heavy equipment rentals. He provides litigation prevention consulting, mediation, arbitration, and expert witness testimony, regarding heavy equipment safety, construction safety and OSHA compliance; construction accidents; construction contract disputes; scheduling; delay claims; differing site condition claims; change order justification, support and processing; nonpayment issues, back charges and lien filings. www.siteworkexpert.com

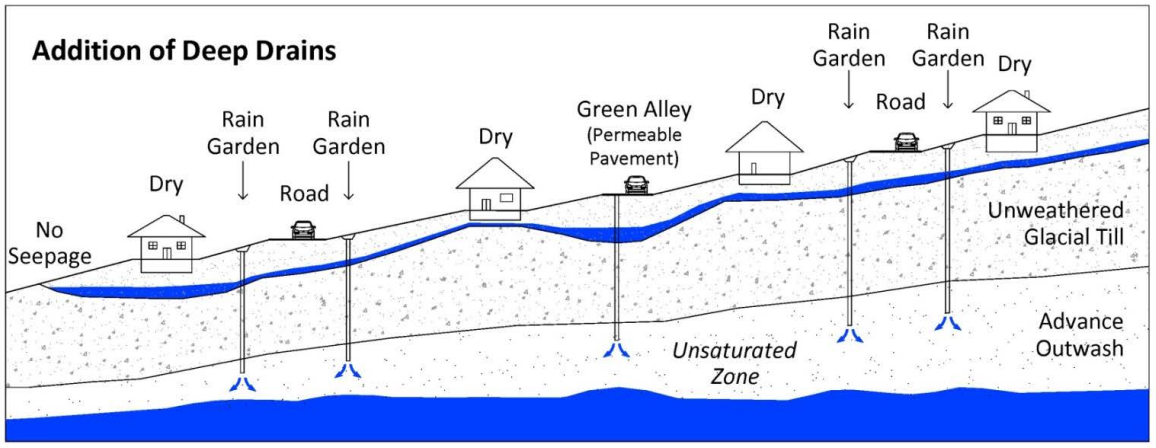
Perched Water Table before Green Stormwater Infrastructure





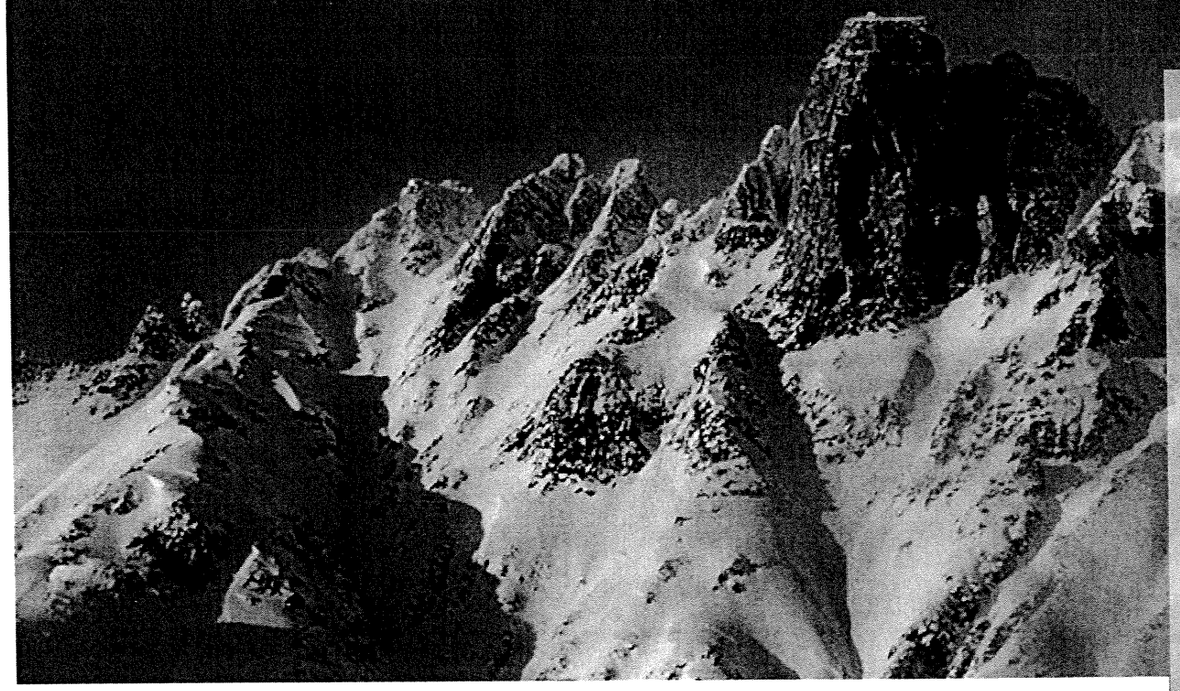
Hypothetical Green Stormwater Infrastructure Scenarios





Kindred Hydro

Home Services Clients Projects About



Your Stormwater Infiltration Experts

Kindred Hydro, Inc. is a water resource consulting firm providing expertise related to the interaction of water with soil and aggregates. We specialize in the design and implementation of stormwater infiltration systems, with a focus on helping our clients implement cost-effective stormwater management solutions, including Low Impact Development.

Kindred Hydro, Inc. is a King County Certified Small Contractor and Supplier (SCS) firm.

Contact Us

J. Scott Kindred, P.E.
scottk@kindredhydro.com
206-660-5417

Our Firm

Personalized service, creative solutions, teamwork.

Kindred Hydro

Services

- Stormwater infiltration testing and design
- Wastewater drainfield assessment
- Groundwater characterization and testing
- Groundwater modeling
- Low Impact Development (LID) design support
- Stormwater retrofit design support
- Underground injection control (UIC) wells for stormwater

Solutions

- Utilizing vactor equipment for subsurface exploration and testing that minimize site disturbance and reduce costs
- Implementing LID at challenging sites (e.g., tight soils, high groundwater, steep slopes)
- Solving flooding and drainage issues associated with shallow groundwater
- Optimizing LID designs to maximize effectiveness and lower costs
- Evaluating potential groundwater impacts resulting from stormwater infiltration

Kindred Hydro

Public Clients

- Bremerton Housing Authority
- City of Bellevue
- City of Bellingham
- City of Mukilteo
- City of Olympia
- City of Redmond
- Douglas County
- Jamestown S'Klallam Tribe
- Hood Canal Coordinating Council (HCCC)
- King County
- Kitsap County
- Seattle Public Utilities (SPU)
- Washington State Parks

Private Clients

- AHBL, Inc.
- Bremerton MotorSports Park
- Brown and Caldwell
- HDR Engineering, Inc.
- Herrera Environmental Consultants
- Kennedy/Jenks Consultants
- Natural Systems Design
- Pace Engineers, Inc.
- Parametrix, Inc.
- Skillings Connolly, Inc.
- Suncadia Resort Development

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Stormwater Planning

- Miller/Walker Stormwater Infiltration Assessment (HDR/King County)
- Mukilteo Stormwater Infiltration Assessment (Brown and Caldwell/City of Mukilteo)
- Hood Canal Basin-Wide Infiltration Feasibility Assessment (Herrera/HCCC)
- Seattle Rainwise Groundwater Impacts (SPU)

Site Development

- Bremerton MotorSports Park
- Craft Cottages Residential Development in Sequim (Parametrix/Jamestown S'Klallam)
- Dosewallips State Park Sewage Treatment Plan (Parametrix/Washington State Parks)
- North Fort Lewis Stormwater Facility (AHBL)
- Suncadia Resort Development (Suncadia)

Stormwater Retrofit

- Barton Stormwater Retrofit Value Engineering (Kennedy-Jenks/King County)
- Boulevard and 22nd Roundabout Infiltration Assessment (Skillings Connolly/City of Olympia)
- Duwe'iq Constructed Wetlands Treatment Facility (Kitsap County)
- Illahee Stormwater Retrofit (Kitsap County)
- Overlake LID/Bioretention (HDR/City of Redmond)
- Ridgetop Boulevard in Silverdale (Kitsap County)
- South Park Stormwater Separation (HDR/King County)
- University CSO Basin Green Stormwater Infrastructure (HDR/King County)

Kindred Hydro

Home Services Clients Projects About

About the Firm

Founded in 2014 by Scott Kindred, Kindred Hydro, Inc. is a water resources firm dedicated to provided cost-effective solutions that achieve project objectives. Our primary expertise is hydrogeology with particular focus on stormwater infiltration. However, we work on a broad range of projects that require understanding and predicting the behavior of water in soil and aggregate. We often team with civil engineering firms and other providers with specialized expertise to deliver turn-key solutions.

Kindred Hydro, Inc. is a King County Certified Small Contractor and Supplier (SCS) firm. The SCS program is also recognized by Sound Transit and the Port of Seattle.

Value Proposition

With our breadth of experience in hydrogeology and civil engineering, we have the integrated perspective to identify both opportunities and pitfalls in your project, thereby maximize success.

About the Founder

Scott Kindred has worked as a consultant in the State of Washington since 1984. With a Bachelors degree in Geology from Brown University and a Masters degree in Civil Engineering from M.I.T., his education focused on groundwater hydrology, contaminant fate and transport, and numerical modeling. Over the years, Scott has worked on stormwater planning and retrofit, environmental site remediation, water supply, mining, master planned developments, residential and commercial development projects.

Scott is a registered professional engineer in the State of Washington.

Deposition:

Introduction:

Degrees,

Consulting hydro since 1987

Specializing in stormwater infiltration over the last 10 years.

Founded Kindred Hydro last year.

Recently conducted a desktop infiltration assessment for the Hanford CSO basin (King County). Not yet final but I have adopted some figures for use in this deposition.

It is my understanding that the neighbors on 19th Avenue have experienced heavy surface water runoff and observed ongoing sump pump operation in their basements since the parking lots were constructed on the property to the west. It is also my understanding that there is occasionally ponding in the nearby intersections during heavy rainstorms.

The surface water runoff and elevated groundwater elevations are likely due to the presence of low permeability soils in the area.

Present topographic map and geologic map. Describe glacial till.

Present cross section B-B' and the supporting well logs. Note that the conditions illustrated on the cross-section are a simplified representation of the actual information, which is subject to interpretation and doesn't provide complete coverage.

Present cartoon of typical neighborhood on glacial till.

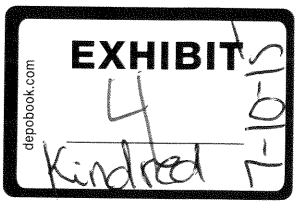
Discuss how the addition of GSI with shallow infiltration can cause higher groundwater elevations and more surface water runoff.

Discuss how deep infiltration can address the shallow groundwater issues but the well logs indicate that this has a low probability of working in this location.

Discuss the risk that a geotechnical firm may conduct infiltration testing that indicates that infiltration is feasible. However, these tests to not address the potential for mounding and current stormwater codes and manuals don't require an assessment of potential groundwater impacts.

The concern that I have shared with my clients is that GSI with stormwater infiltration is proposed as a potential BMP for managing stormwater as the campus is build out. In my opinion, GSI with infiltration should not be implemented in this area.

GSI without stormwater infiltration would be ok, but care should be taken to ensure that no stormwater is added to the subsurface. Green roofs would be ok. Lined bioretention facilities would be ok. I want to emphasize that if bioretention facilities or pervious pavement are implemented with underdrains, the bottom of the facilities should be lined to ensure that water is not added to the subsurface.



In addition, as acknowledged in the EIS, the existing stormwater system appears to be inadequate and should be fixed. Ideally this occurs as soon as possible, but it certainly should be address as the campus is re-developed.

Swedish Cherry Hill Notes

SwedishCherryHillMIMPFinal DirectorsReport

Page 84: Calls for a geotechnical analysis for each new development that would identify depth to groundwater and subsurface conditions that may affect groundwater flow. Analysis would include recommendations for addressing groundwater.

Page 85: To address groundwater impacts, DPD conditions requires that the mitigation measures in Section 3.9.4 of the final EIS shall apply and are reiterated in Section VII.

Page 111: In #56 notes that each project shall have a geotechnical report that identifies subsurface soil and groundwater conditions and would include measures for mitigating any identified impacts.

Page 111: In #70, indicates use of LID measures such as bio-retention where feasible to reduce the demand on stormwater infrastructure

Page 112: In #71, notes that in addition to LID measures, acknowledges the need for flow control and water quality measures as part of storm drainage design requirements. Indicates likely BMP's are bio-filtration tree wells, stormwater filter units or water quality vaults

Page 112: In #72, calls for nature drainage and green roofs, including GSI for flow control and water quality treatment to the maximum extent feasible.

Final EIS

Page 1-26: Use of bioretention to reduce the demand on stormwater infrastructure. Development will trigger need for flow control and water quality measures and design will address Seattle stormwater design guidelines and using BMPs, such as biofiltration tree wells, stormwater filter units, or water quality vaults.

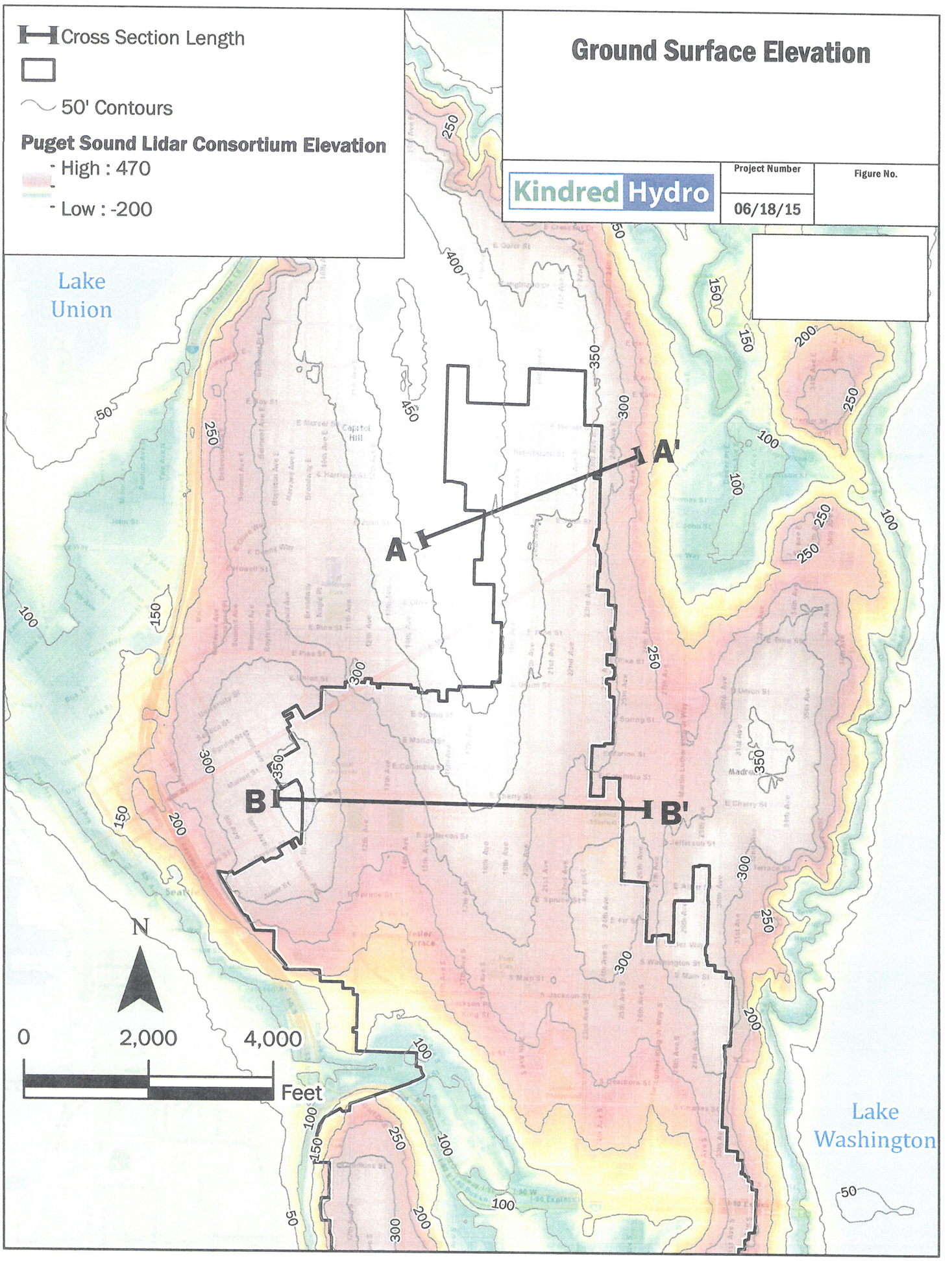
Page 3.1-8: Indicates use of GSI for flow control and water quality to the maximum extent feasible

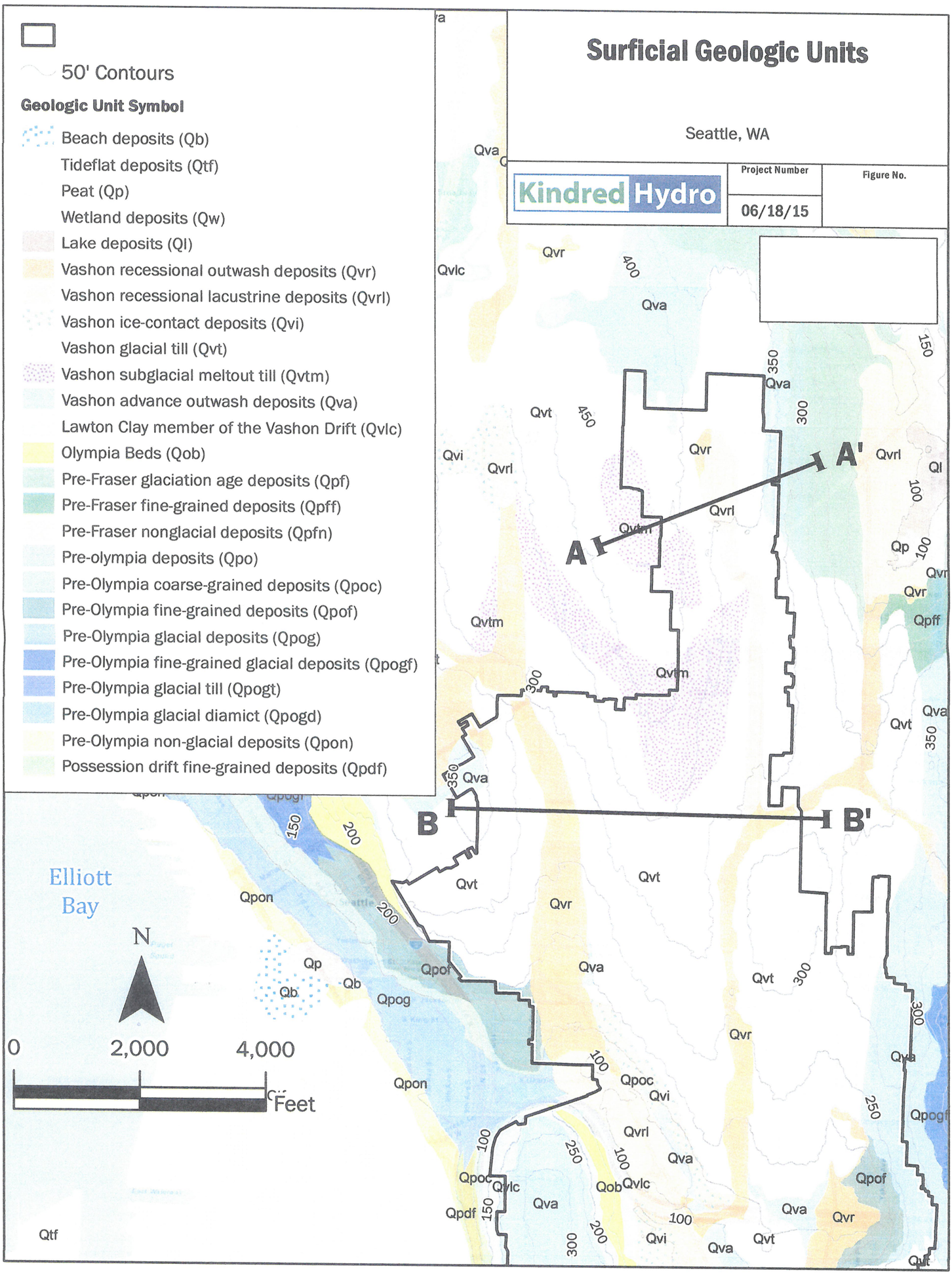
Page 3.8-12: Indicates that storm drainage on 23rd Ave. is known to be deficient and there are plans to build additional capacity, and utilize GSI to reduce flows.

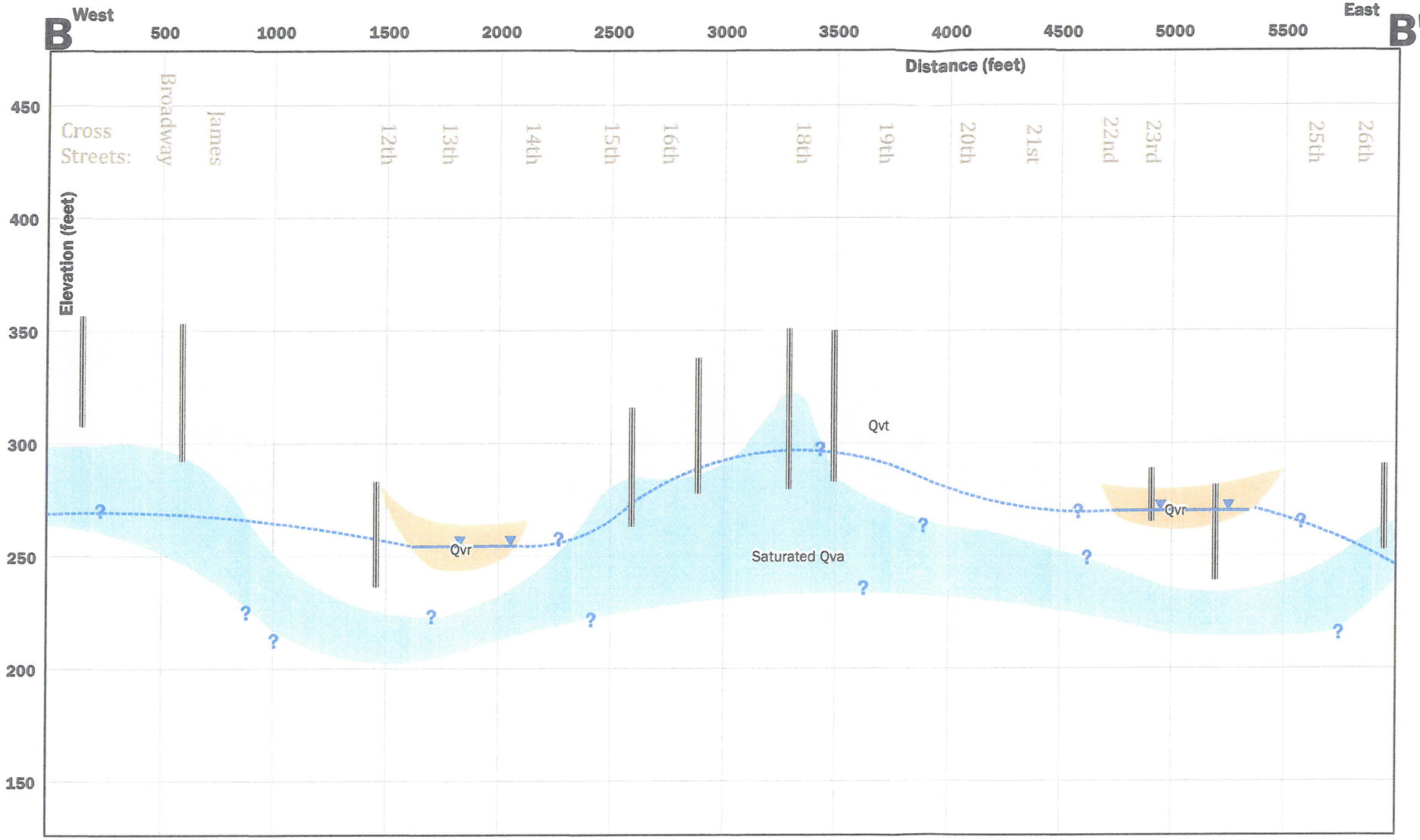
Page 3.8-13: Indicates that GSI will be used to reduce demands on stormwater infrastructure.

Page 1-14: Indicates that geotechnical assessments will be conducted to address groundwater.

Page 3.9-2: Section on groundwater, which reports groundwater at an elevation of approximately 300-305 (35-50 feet below the surface).







Boring

Approximate Water Table Level in Recessional Outwash

Potentiometric Surface in the Advance Outwash Aquifer

Geologic Unit Symbol

Vashon recessional outwash deposits (Qvr)

Vashon glacial till (Qvt)

Vashon advance outwash deposits (Qva)

Due to the limitation of data, the contacts between geologic units should be considered approximate.

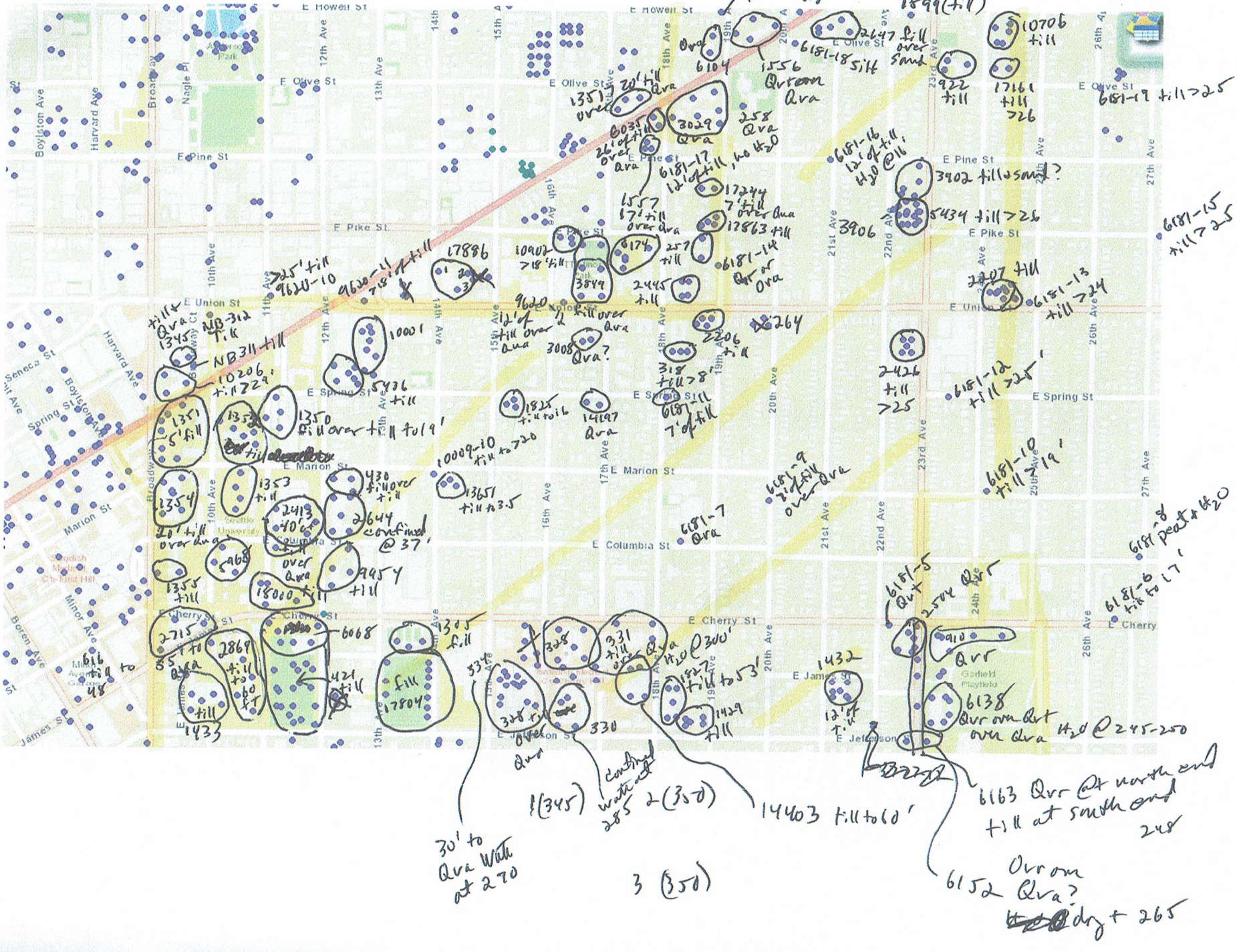
Question marks indicate where the water table and geologic unit contacts were inferred based on best professional judgement

Cross Section B-B'

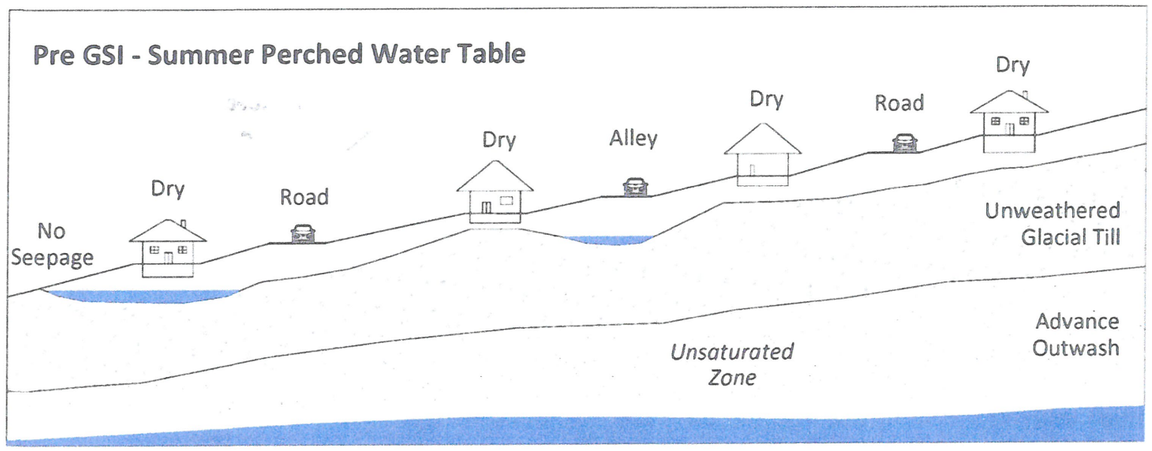
Kindred Hydro

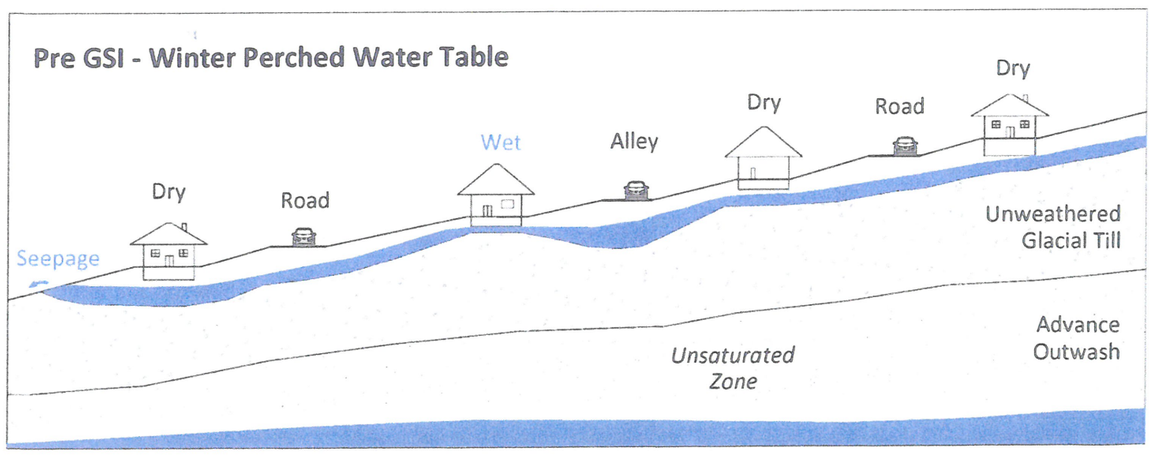
Project Number	Figure No.
06/18/15	

12


E Howell St
E Olive St
E Pine St
E Pike St
E Union St
E Spring St
E Marion St
E Columbia St
E Cherry St
E James St
E Jefferson St
Boylston Ave
Harvard Ave
Broadway
Nagle Pl
10th Ave
11th Ave
12th Ave
13th Ave
14th Ave
15th Ave
16th Ave
17th Ave
18th Ave
19th Ave
20th Ave
21st Ave
22nd Ave
23rd Ave
24th Ave
25th Ave
26th Ave
27th Ave
Seneca St
Spring St
Marion St
Minor Ave
Boren Ave
Cornish College of the Arts
Seattle University
Garfield Playfield
4305-1 Qva H2O @ 17
1599(till)
10706 till
2447 till over sand
6181-18 silt
1556 Qvr over Qva
922 till
17161 till >26
6181-19 till >25
6104 Qva
1351 over Qva
6035 26' of till over Qva
3029 Qva
258 Qva
6181-16 12' of till H2O @ 16
3902 till & sand?
6181-17 12' of till, no H2O
17244 7' till over Qva
17863 till
1557 17' till over Qva
3906
5434 till >26
6181-15 till >25
10902 >18' till
6174
257 till
3849
2445 till
6181-14 Qvr or Qva
9620-11 18' of till
9620-10 >25' till
17886
9620 12' of till over Qva
3008 Qva?
2207 till
6181-13 till >24
2264
2206 till
318 till >8'
6181-12 till >25'
2426 till >25
1345 Qva
NB-312 till
NB 311 till
10206 till 29'
10001
5436 till
1351 5' till
1350 till over till to 19'
1825 till to 16
14197 Qva
6181-11 7' of till
10009-10 till to 20
13651 till to 35
6181-9 7' of till over Qva
6181-10 till to 19'
1353 till
430 till over till
2644 confined @ 37'
2413 40' of till over Qva
1354 20' till over Qva
5968
18000 till
945Y till
6181-7 Qva
6181-8 peat & H2O
6181-5 Qvr
2504 Qvr
1355 till
2715 55' till Qva
2869 till to 60'
6068
421 till
17804
1305 till
616 till to 48'
1433 till
328
331 till over Qva H2O @ 300'
328 till over Qvr
330
534
151-7 till to 53'
1429 till
1432
12' of till
910 Qvr
6138 Qvr over Qvt over Qva H2O @ 245-250
6163 Qvr at north end till at south end 248
6152 Qvr over Qva? dry + 265
1(345)
water at 285
2(350)
14403 till to 60'
30' to Qva With at 270
3 (350)

Perched Water Table before Green Stormwater Infrastructure





Hypothetical Green Stormwater Infrastructure Scenarios